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More Canadian Newsprint Expected in 1946

Survey Indicates Total U. S. Shipments Will Be at Annual Rate of 3,696,000 Tons in First Half of Next Year—Cautions Against Over-Optimism—Ends Print Paper Curbs—Other Late News.

[FROM OUR REGULAR CORRESPONDENT]

MONTREAL, Que., December 24, 1945—Results of a comprehensive survey undertaken by the Newsprint Association of Canada to determine as accurately as possible the supply of newsprint which will be available in 1946, have now been made public, mainly for the information and guidance of newspaper publishers in the United States, the bulk of whose newsprint supply comes from Canada. The conclusion drawn is that, to preserve a sound situation, consumers should realize that total 1946 supply, as presently estimated, does not justify an increase in the present rate of total ordering, as, in the absence of such information, might happen now that controls over newsprint have been lifted in the United States.

On the basis of estimates for the first six months of 1946, it is figured that total shipments from Canadian mills will be at an annual rate of 3,696,000 tons, of which shipments at an annual rate of 3,000,000 tons will be available for U. S. consumers. Both of these figures are new all-time highs of Canadian performance.

The point is made, however, that total supply for the United States will not be at a new high, for the reason that supply from sources other than Canada has materially diminished. As now calculated, the total U. S. supply in the first six months of 1946 will be at an annual rate of 3,870,000 tons. This is well above the pre-war average and also of the 1945 level, but it is still considerably less than the total supply in 1941 and in 1942.

Furthermore, in true comparison with 1941, the supply for the United States in 1946 is even lower than the tonnage totals indicate. This is due (1) to the fact that users and uses of newsprint in the United States have increased in number since 1941 and the individual share is reduced accordingly; and (2) to the low stock level at the end of 1945. These two factors call for a deduction of at least 240,000 tons from the 1946 total, which leaves the relative position at least 355,000 tons, or probably 9 to 10 per cent, below the 1941 level.

Prospects of Increased Tonnage

Dealing with the subject of prospective increase in tonnage as a result of an anticipated larger cut of pulpwood this winter, the Association stresses that in the early months of 1946 most Canadian mills will be endeavoring to meet post-war demand while still under restricted wood supply, and says that no further estimate of 1946 performance is feasible until new wood figures become available next spring. It adds:

"One should note, however, that the present estimate of 3,696,000 tons of total production in 1946 is 86% of total Canadian rated capacity. Maximum production over a period probably could not exceed 96 per cent of rated capacity. Maximum improvement would thus be about 10 per cent of capacity, or about 400,000 tons in a year, to meet obligations in all markets. Even if this maximum could be achieved in the second half of 1946, which is highly doubtful, improvement in the half year could not exceed 200,000 tons."

Shipments to other Markets

Of the total tonnage, consumers in Canada have received an average of 6 per cent of Canadian shipments through the pre-war and wartime periods and will have the same share allotted to them in 1946. In pre-war years U. S. consumers received 76 per cent of total Canadian output and 81% through the war years, and they will receive 81% again in 1946. Shipments to all other countries were 18% pre-war, 13% in wartime, and are still down to 13% in 1946. Continuance of this low share in 1946, actually a decrease from 1945, both in tons and percentage, is due chiefly to post-war monetary restrictions, the 1946 position of British consumers being an example; they are being rigidly kept to 4-page newspapers of restricted circulation.

"Wood Extension" Methods

According to a report of the Wartime Prices and Trade Board, a significant factor in the maintenance of the high level of newsprint production in Canada has been the efforts by the industry to produce newsprint with the lowest possible wood consumption per ton of paper—commonly known as the application of "wood extension" methods. The Board also reveals that the experimental manufacture of 30-lb. newsprint was abandoned largely because it was found that the advantages of this lightweight paper were more than offset by the fact that it reduced the output of those newsprint machines which had been operating at capacity and that the wood extension program could not be applied when mixed weights were produced.

Comparison With 1945

A warning is issued against American buyers drawing ideas of too optimistic a nature from comparison of the estimated 250,000 tons a month from Canada in

(Continued on page 22)

Four Paper Mills Sign Master Agreement

First Labor Agreement of its Kind in Wisconsin Provides For Joint Negotiation Between Concerns and Four Local Unions Yearly —Kimberly-Clark Starts Expansion Program—Other Late News.

[FROM OUR REGULAR CORRESPONDENT]

APPLETON, Wis., December 24, 1945—A uniform master labor agreement governing wages between the American Federation of Labor's International Brotherhood of Paper Makers and the four rag bond paper companies of Wisconsin was announced December 19 by the four companies and by Ernest B. Lambton, regional director of the union. The union estimates that between 950 and 1,000 workers were affected.

The companies involved are the Fox River Paper Corporation of Appleton, the Gilbert Paper Company of Menasha, the Neenah Paper Company of Neenah, and the Whiting-Plover Paper Company of Stevens Point.

The agreement is the first of its kind in the industry in Wisconsin and probably in any industry in the state, and is said to be the second agreement of its kind in the paper industry in the United States.

It provides for joint negotiation between the companies and the four local unions once a year, and does away with separate contract negotiations. Wages, working conditions and other factors bearing on labor-management relations are uniform in the four mills.

In negotiations which brought about the master agreement, a wage increase of from 5 to 8 cents an hour for employes in the four mills was agreed upon. The new base scale, retroactive to October 29, is 73 cents per hour for men and 60 cents for women. This is on the basis of the present 48 hours a week operation of the mills, which gives the employes take-home pay equivalent to 52 hours a week.

A joint wage committee will be set up by employers and the unions to study job classifications and rates in the four mills, with the aim of eliminating rate inequalities. These will be corrected in conformity with the present system of fixing job rates every three months.

The master agreement provides for identical daily and weekly hours of work, overtime pay, starting and stopping time, compensation for call-backs and reporting time, changing of wires, vacations with pay, shift differentials, working time and pay rates on Sundays and holidays, and for universal arbitration of disputes in all the mills. Before the agreement was adopted, there was a wide variation in the way these matters were handled in the different mills.

The agreement runs for a year but contains a provision that either employer or employe can re-open negotiations upon 30 days notice. Fundamentally, the agreement is intended to establish a uniformity of practice in those matters that rightfully come within the scope of collective bargaining.

It is based largely on a similar contract between paper makers unions and paper manufacturers in Washington, California and Oregon, covering 16,000 employes in all the paper mills in those three states. This agreement has been in effect since 1935.

Mr. Lambton said that negotiations looking toward adoption of master labor agreements by other large paper companies in Wisconsin are underway. Meetings have been held with representatives of several large companies and a committee of five men from employers and five from the unions will meet soon to draft a tentative agreement. He believes that eventually a labor agreement will be worked out to include all the paper mills and their employes in Wisconsin, Minnesota and Upper Michigan.

Kimberly-Clark Start Expansion Program

Expansion and improvements already started and contemplated by Kimberly-Clark Corporation, Neenah, Wis., entail the expenditure of about $10,000,000, Cola G. Parker, president, said in an article in Co-operation, company publication, released last week.

"Our sales department," he wrote, "has every reason to believe it can sell a lot more book paper in the years ahead than ever before. But in the same breath they say, "We can only sell if the paper is highest quality and if we can compete in price."

"This points the finger at the Quinnesec mill, which, since 1898, has been in successful operation. If major improvements are not made, however, this mill would soon feel the stress of competition which will be upon us in postwar years. Therefore, in justice to our loyal partners in Niagara, as well as the company's best interest, a major repair and expansion program will presently be underway in that plant.

"Next on the program of postwar advance is a modern high-speed creped wadding machine displacing the 40-year-old paper machine at Lakeview, making specialty papers.

"War has a way of stimulating research out of which come new commercial products.

"From the researches of our war products division during recent war years came paper plastics, which may well achieve a recognized place among our commercial products. A pilot plant, now under construction, adjoining the Kimberly mill, will see a full scale experiment in this field."

S. F. Shattuck Honored

S. F. Shattuck, Neenah, Wis., who has retired as a vice president of Kimberly-Clark Corporation, was made an honorary member of the Pension group from the Kimberly, Wis., and Atlas mills, the latter located at Appleton, at the annual dinner at the Kimberly clubhouse Saturday evening, December 15. About 60 persons from the two mills were present.

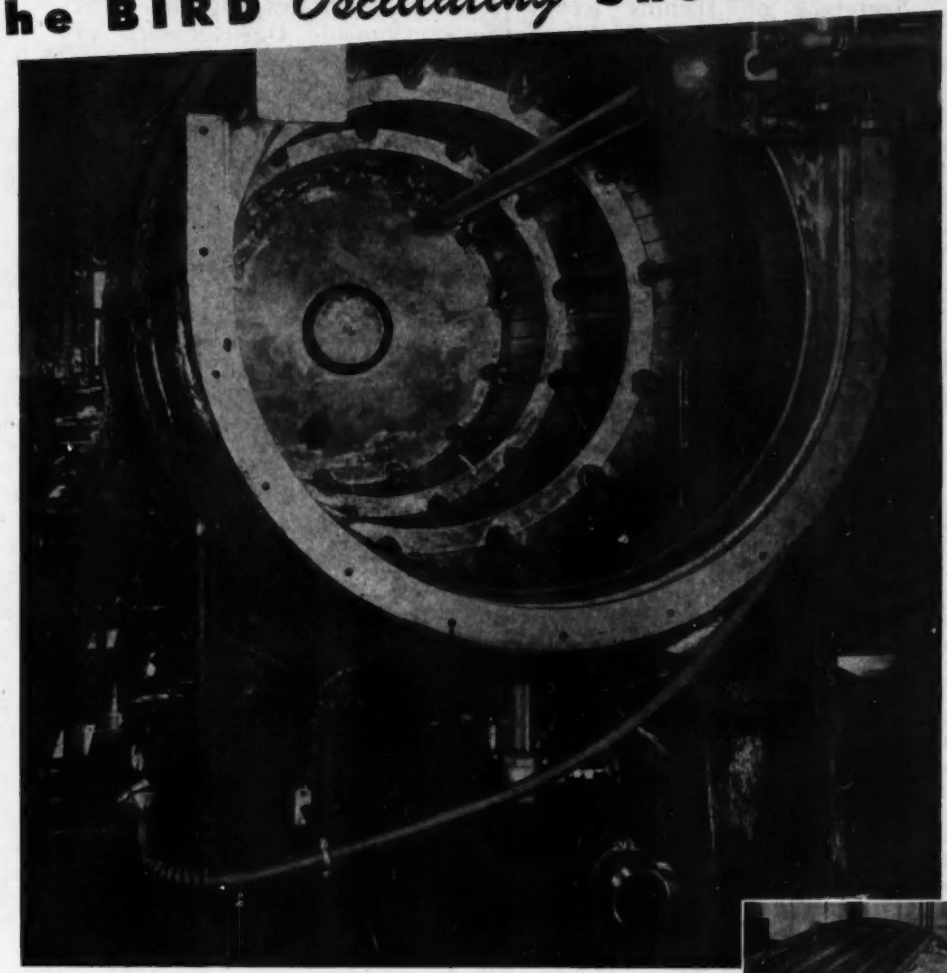
J. T. Doerfler, Kimberly mill manager, welcomed the group, members from the Atlas mill being introduced by Cliff Williams, its manager, and those from the Kimberly mill by Al Briggs, personnel director.

Mr. Doerfler thanked the new pensioners at Kimberly for staying on the job during the wartime manpower shortage. He said they were eligible earlier for pensions but all continued to work during the war.

Badger Mill Notes

The annual dinner of Badger Paper Mills, Inc., Peshtigo, Wis., for the fire department, the company's fire brigade and safety council was held Thursday evening, December 13. Films on "Safety Facts" were shown. Walter Adrian presided.

The BIRD *Oscillating* Shower Pipe



- keeps your Bird Screen plates continuously clean and open, helps maintain maximum screening efficiency
- employs a minimum amount of shower water and thereby permits improved control of papermaking water and reduces white water losses; where stock is run at high temperatures operating economy is materially increased
- improves Screen accessibility and ease of maintenance; notice the neat flexible shaft drive operating from the eccentric shaft of the Screen itself

May we send you detailed information about this new Bird Oscillating Shower Pipe and its application and benefits for you?

BIRD MACHINE COMPANY

SOUTH WALPOLE • MASSACHUSETTS

Urges More Incentive To Lift Production

Secretary of Illinois Retail Association States Before Professional Group That All Artificial Controls Be Removed to Insure Future Prosperity—Charge OPA Favoritism—Other News.

CHICAGO, Ill., December 24, 1945.—Members of the Chicago Professional Group were told, at their dinner meeting of December 17, that the country cannot live half under control and half out of control and that unless America were shortly rid of artificial controls it could not achieve its goal of full employment under private enterprise. The speaker was J. T. Meek, executive secretary of the Illinois Federation of Retail Associations, who urged the ninety members and guests present to decide for themselves what kind of a world they wanted and to then act in the only way available to them—at the precinct wherein they cast their vote for political office holders. The speaker said that America could not employ 50,000,000 people and produce nearly 140 billions a year unless markets were rid of red tape, unless production went into high gear, prices were kept reasonable, tax laws were readjusted to "realistically meet the fiscal problems of the country," unless artificial controls were abandoned and unless the citizens of America accepted civic responsibilities now shrugged off with "typical business man apathy."

Mr. Meek said that current restrictive OPA price adjustment policies were so slowing up production that the goal of enough supply to insure freedom of control was further removed every minute. He pointed out that "this country is in the middle of a tragic cycle. No incentive is given to production, thus folks argue controls are necessary and thus the production incentives are again denied. We are not meeting this issue with honesty. We are temporizing with the economic fate of America resting on our shoulders. We do everything in the world but something that is practical. Our only hope is through the Congress of the United States, yet perhaps not more than five men in this room even know the name of their congressman!"

Program Chairman Kubicka introduced the speaker and, following Mr. Meek's remarks, turned the master of ceremonies job over to professional entertainers who kept the audience busy at group singing for more than an hour. Entertainment and other features were contributed by a long list of friends of the Group who were listed in last week's account of this meeting.

Chaplain at Salesmen's Party

Rev. Wallace Conklin, bishop of the Chicago diocese and chaplain of the Salesmen's Association of the Paper Industry, gave his annual Christmas message to the western division of the SAPEYES on Monday noon, December 17, at the Hotel Sherman. An unusually large audience of members and guests turned out on a bitter cold day to pay their respects to one of the most excellent and respected speakers in this area. They were rewarded by a thought provoking story of the current responsibilities of Americans and with a forceful comparison between the amount of money paid out in the world for frivolity and pleasure as compared to the pitifully small amount paid out for religious education. The Bishop stressed the fact that we could expect little more than friction, crime and uncertainty in the world until the proportions now existing were brought down nearer to a parallel.

Hold Annual Christmas Event

The western division of the Salesmens Association of the Paper Industry held its annual Christmas party on Thursday evening, December 20, with more than one hundred members and guests filling the room at the Hotel Sherman where the festivities occurred. Once more the event was under the expert guidance of Ben Babbitt who outdid himself as master of ceremonies and as talent arranger. Professional entertainers contributed a great deal to the success of the evening, but it was the "stand-by" piano team of Harold Pfister and Harry Kerr and the impromptu hilarity that put over one of the biggest parties the SAPEYES have had in many years.

The piano team of Harold and Harry, a fixture bit of entertainment for many years, was as popular and well received as ever. There were no speeches and perhaps the only serious note crept in when vice president Pat Patterson of Flambeau presented golf chairman Jim Sensenbrenner with a fifty dollar war bond for his grand service as chairman of this important committee. The seriousness arose over the condition of Mr. Patterson's voice which, through a siege of frequent colds, developed a vocal resemblance to either a bull frog or a bull. SAPEYES are still debating that issue. Jim Coy, Flambeau executive, was given a ten dollar merchandise certificate for winning the prize for the best attendance at the weekly luncheons. Jim attended 37 times during the year as evidence of his loyalty to the SAPEYES.

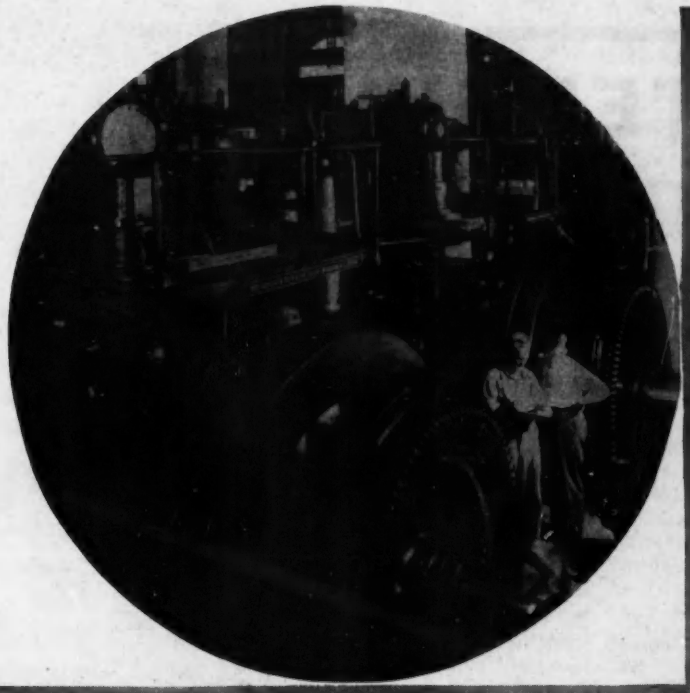
Charge OPA Favoritism

A startling story appeared in the December 19 Chicago Tribune stating that with "other paper mills cutting down their production of high grade wrapping paper because of OPA ceilings, a Minneapolis company headed by a former vice chairman of the WPB, has obtained the only price adjustment granted by OPA to coarse paper manufacturers."

According to the statement, Minnesota and Ontario Paper Company received its price increase from OPA on November 9. The company is headed by Donald Davis who resigned October 1, 1944, as WPB vice chairman. Operators of other paper companies, the story continues, asserted that they had petitioned the OPA for price adjustment time after time without action. The OPA insisted the adjustment granted the Minneapolis concern resulted from the first official application made under a provision in effect since December, 1944.

The Tribune article states that Davis' company was permitted increases ranging from 10 cents to 50 cents a hundred pounds on four types of super-standard unbleached kraft wrapping paper on the grounds the company's former prices created a hardship. Along with the story, the newspaper quoted a large maker

(Continued on page 18)



These Diesels have given uninterrupted service with negligible maintenance costs for over 16 years—thanks largely to efficient lubrication with Gulf Parvis Oil.

The *why* of better Diesel lubrication with the improved Gulf Parvis Oil:

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Read at the left the important reasons for the outstanding performance of Gulf Parvis Oil. Every one of these features points to better lubrication of your Diesels—call in a Gulf Service Engineer today and ask him to recommend the proper grade to fit your particular requirements.

Gulf Parvis Oil—and the more than 400 other quality oils and greases in the Gulf line—are available to you through 1200 warehouses in 30 states from Maine to New Mexico. Write, wire, or phone your nearest Gulf office.

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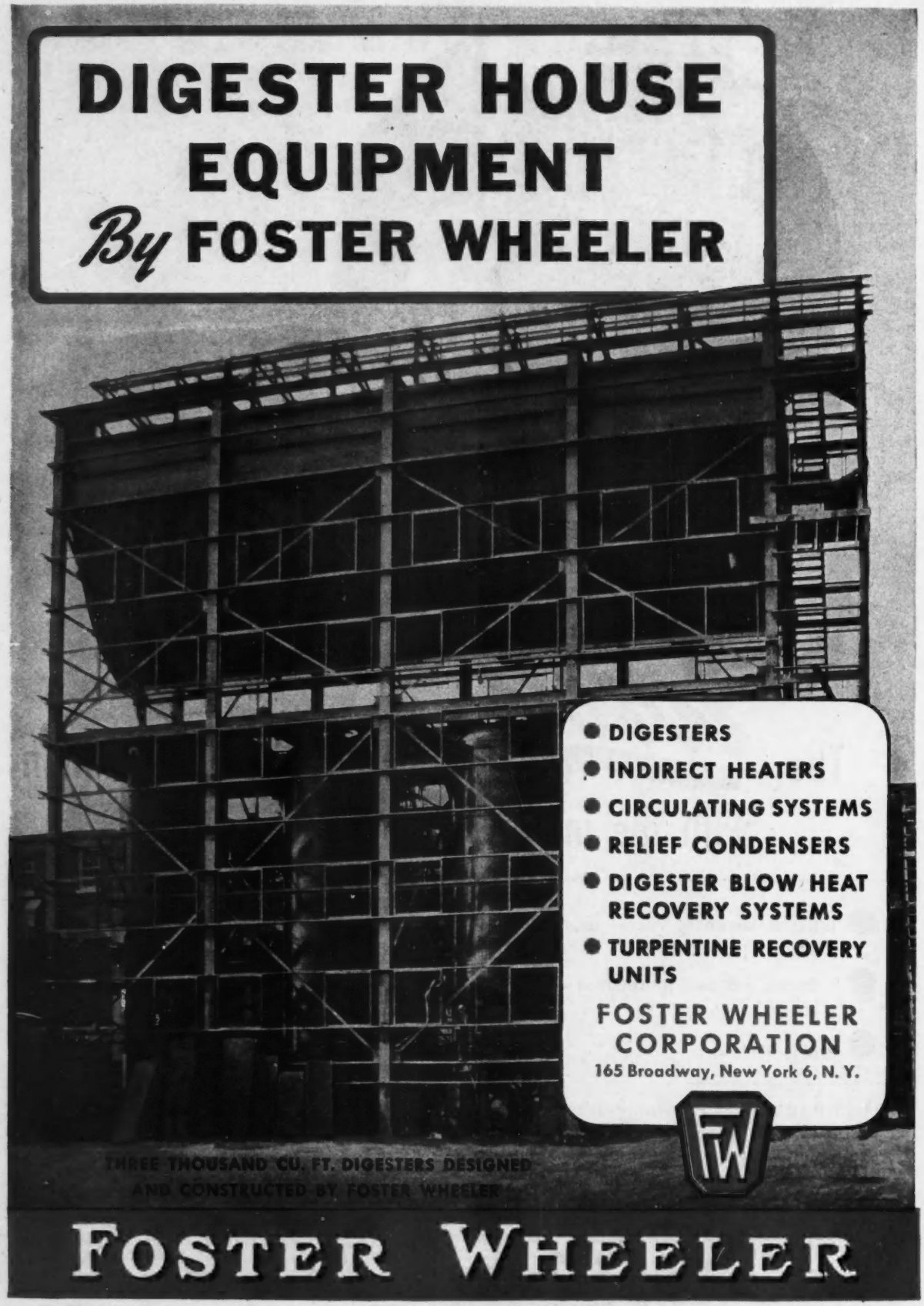

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When Paul Bunyan swung his axe, there would be a crack like a cannon shot, and the tree would thunder to the earth.

A reproduction of this incident from the fabulous life of Paul Bunyan—the first of a series—will be sent on request. It will contain no advertising.

Mid-West Trade Groups Elect

CINCINNATI, Ohio, December 21, 1945—The Illinois State Paper Merchants Association has elected the following Officers and Directors for the coming year:

President, Frank A. Weber, John C. Streibich Company, Peoria; Vice-President, S. B. Gaines, Capital City Paper Company, Springfield; Executive Secretary-Treasurer and Counsel, John L. Richey of Cincinnati. These Officers constitute the Board of Directors of the Association.

The Chicago Paper Association has elected the following officers and directors: President, Robert E. Knox, Knox and Schneider; First Vice-President, William Chukerman, J. Chukerman and Sons; Second Vice-President, Louis Brown of Atlas Paper Company; Recording Secretary and Treasurer, William Shapland, Fred Rentz Paper Company; Executive Secretary and Counsel, John L. Richey; Board of Directors, Samuel S. Weil, Joseph Weil and Sons, Inc., Chairman; Walter Schulman, Levin Brothers Paper Company; Leo S. Altholz, Inlander-Steindler Paper Company; Robert Levinson, Eagle Wrapping Products Company; William Knox, Knox and Schneider. All of these persons are from Chicago excepting John L. Richey of Cincinnati. The installation of these officers and directors will be held at a social affair and dinner at the Hotel Bismarck, Chicago, Tuesday night, January 8th, 1946.

The Wisconsin Paper Merchants Association will hold its annual election of officers and directors in Milwaukee at the Hotel Schroeder on Thursday, January 10th, 1946 and the annual election of Officers and Directors of the Central States Paper Trade Association will be held at the Columbus Athletic Club, Columbus, Ohio on Tuesday, January 29th and the election of Officers and Directors of the Middle States Wrapping Paper Association will be held at the Columbus Athletic Club, Columbus, Ohio on Wednesday, January 30th. The annual meeting and election of Officers and Directors of the Paper and Twine Association will be held at the Hotel Spink Wawasee, Lake Wawasee, Indiana, on Saturday, June 15th, 1946.

Union Bag Orders New Machine

SAVANNAH, Ga., December 19, 1945—Installation of a new paper machine and enlargement of the bag factory to provide conversion and storage facilities for the additional paper, representing the latest development in the continuous expansion of the Union Bag plant at Savannah over the last ten years, were announced today by Alexander Calder, president of the Union Bag & Paper Corporation. The contract for the new paper machine has been awarded, and it is expected to be in operation early in 1947, Mr. Calder stated. He pointed out that the new machine would be the same size as the four existing machines. The addition to the bag factory will approximate 195,000 square feet of floor space, with construction starting shortly after the first of the year.

St. Regis to Build in Vancouver

VANCOUVER, B. C., December 22, 1945—St. Regis Paper Co. (Canada) Ltd. will erect a new paper bag plant at Arbutus and 11th Avenue, Vancouver. The plant will cost $320,000. The Vancouver civic board of works has agreed to proceed with the widening of Arbutus Street, by a 17 foot strip at either side to facilitate establishment of this plant.

H & W Wage Rate Unsettled

WATERVILLE, Me., December 20, 1945—Negotiations between management of the Hollingsworth and Whitney Co. and two American Federation of Labor unions have ended in a deadlock after a two-day conference on the union demand for a 20 cents-an-hour pay increase. Officials of the Waterville company put forth a counter-offer of a 12½ per cent pay boost, which the Waterville local of the International Brotherhood of Papermakers and the Madison local of the International Brotherhood of Pulp, Sulphite and Paper Mill Workers voted to accept. But the Waterville local of the later union refused to accept the offer. A spokesman for the union said it preferred a flat hourly increase as workers in the lower wage brackets would benefit more.

The two AF of L unions have scheduled conferences with several other Maine paper mills where they have contracts, over the proposed 20 cents an hour increase.

Ashland Mills Sign Second Contract

RUMFORD, Me., Dec. 22, 1945—A second contract between the Ashland Paper Mills, Incorporated, of Ashland, N. H., and Local 12925, United Mine Workers, negotiated last November, has been signed recently, Cecil V. Crawford, UMW official has announced.

Included in the new contract is a general wage increase of five cents an hour, provisions for double time on Sunday, and Christmas bonuses of $25 for employes who have worked over six months, and $10 for those who have worked less than six months. Time and a half was agreed upon for nine holidays including Fast Day and V-J Day. Also included were insurance provisions and two weeks vacation with pay based on a 48-hour week for those who have been employed by the company three years.

Sandy Hill Plans Larger Production

HUDSON FALLS, N. Y., December 24, 1945—Announcement is made here that the Sandy Hill Iron and Brass Works is planning a large increase in production. It was stated that a reorganization and expansion of the foundry has become necessary in order to handle a large production increase at the plant which has also resulted in the appointment of Cleon R. King, of Wilmington, Del., as superintendent of the former division. He comes to the local firm after directing a special casting contract for the Lobdell Car and Wheel Company of Wilmington, for the past year. Previously he was associated with the United States Cast Iron Pipe Company of Youngstown, Ohio, for nearly forty years. He plans to make his home here.

Hubbs Opens in Syracuse

ROCHESTER, N. Y., December 20, 1945—The Hubbs & Hastings Paper Company, is opening a branch house in Syracuse, N. Y. From the latter point, central New York customers will be serviced with faster deliveries, and this branch house will enable the Hubbs & Hastings Paper Company to offer to industries and retail outlets located in this area a trained sales staff of men capable of working out packaging and other paper problems. The warehouse and office are located at 339 West Jefferson Street.

In charge of the Syracuse Branch, as manager, is Monte Wilkinson, who has had wide experience, both in manufacturing and distributing.

BROUGHTON UNIT VACUUM CONTROL

for paper machine suction boxes

Dependable control of flat-box vacuums.

Eliminates completely the flat-box vacuum pump.

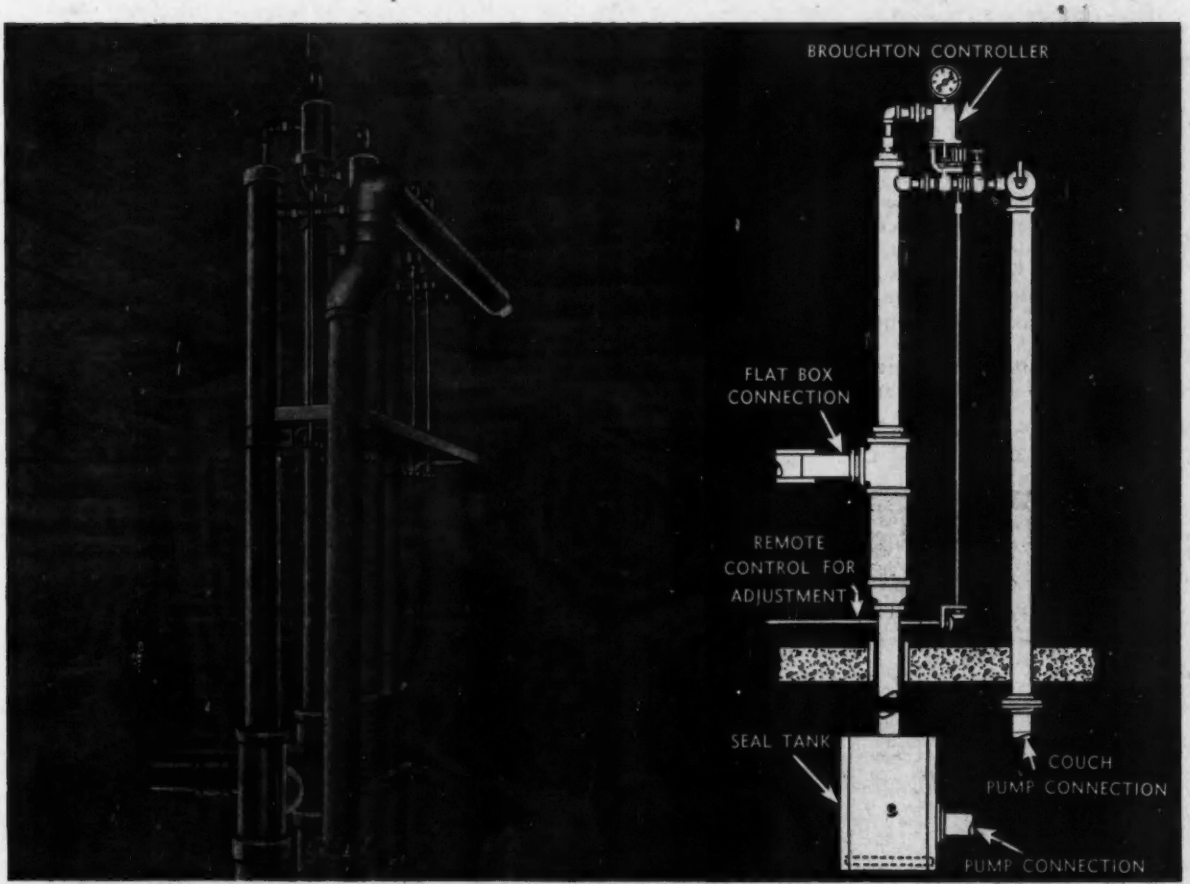
Allows more water to be worked into the sheet.

In many installations helps decrease two sidedness because of maintained gradated vacuums. Much more uniform water-mark.

All adjustments may be made from the front of the wire.

Endorsed by users.

The air and water are separated, the water falling by gravity into a seal tank. The individual vacuum breakers, a function of the Broughton Vacuum Controller, enters air in controlled amounts, into the boxes only, thereby diminishing enormously the amount of air handled as compared to all other systems now in use.



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Manufacturers of mechanically operated Oscillating Showers, and Unit Vacuum Controls for paper machine suction boxes.

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Use B&W BOILERS for LOW COST STEAM

ANY CAPACITY • ANY PRESSURE
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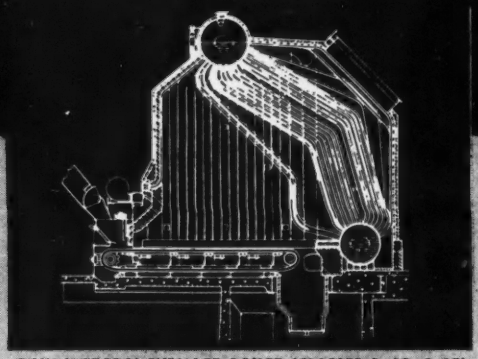
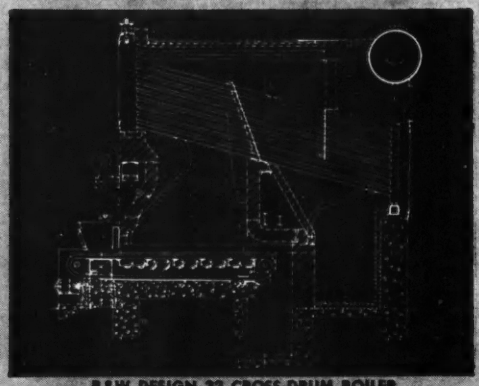
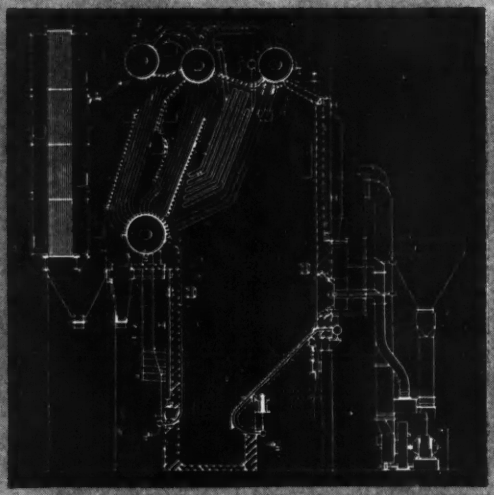
Highest standards of performance with respect to continuity of service, dependability, over-all operating efficiency, and greatest return on investment, are assured when any job of supplying steam requirements is entrusted to B&W Boilers. From the wide variety of time-tested, performance-proved B&W boiler designs, you can always be sure of getting units having the features necessary to provide economical steam generation under any combination of capacity, pressure, temperature, fuel and space requirements encountered in modern boiler installations. When you call on B&W for boilers, you call on a background of over 60 years' unsurpassed experience in designing, building steam generating equipment having a long record of highly satisfactory service wherever steam is used.



B&W INTEGRAL-FURNACE BOILER (CLASSES 9, 12, & 15)
This Integral-Furnace Boiler is available for firing with stokers or with oil, and in sizes ranging from 1353 to 6506 sq. ft. of heating surface. Having a water-cooled furnace of special design, this boiler provides the dependability of central-station boilers, with efficient and smokeless combustion.



B&W DESIGN 32 CROSS-DRUM BOILER
This unit is widely used in small and medium-size power plants where refractory furnaces are suitable. It provides the advantages of the straight-tube, sectional-header construction used in B&W Cross-Drum Boilers designed for larger capacities.



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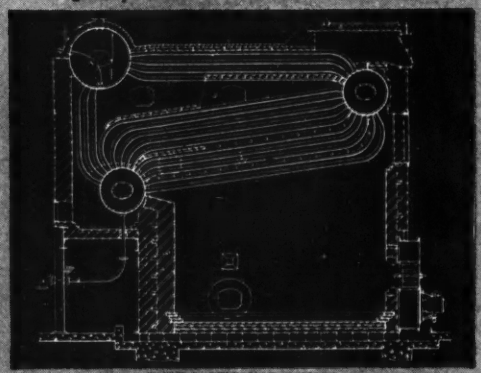
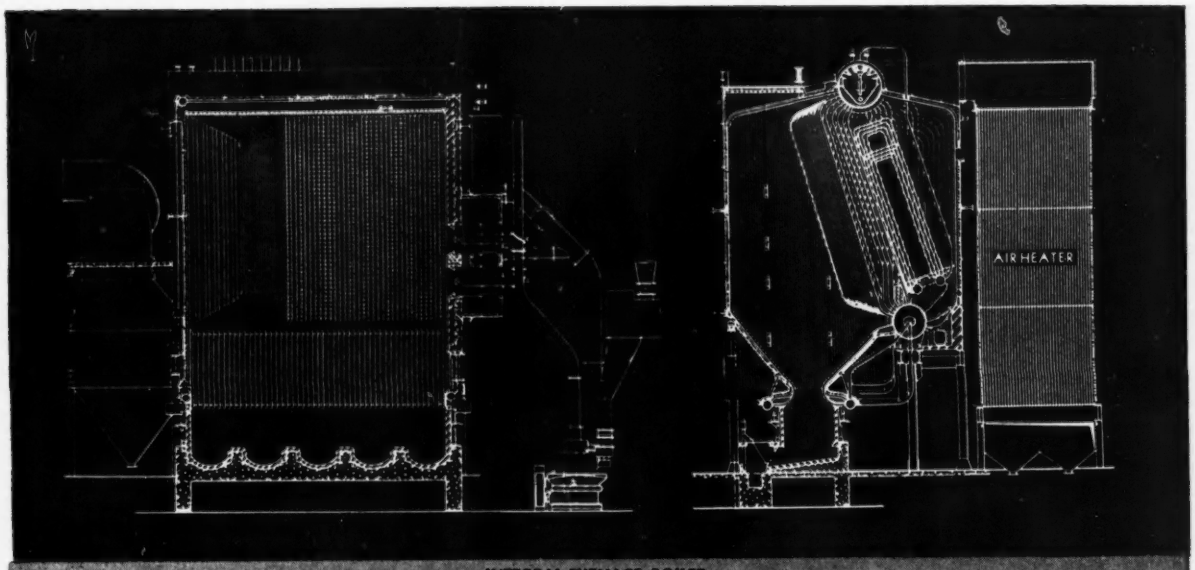
The Stirling Boiler fully meets the requirements of modern operating conditions. It readily responds to sudden and heavy demands for steam, and delivers dry steam at relatively high ratings when operated with water having a high concentration of solids. May be fired with any fuel.

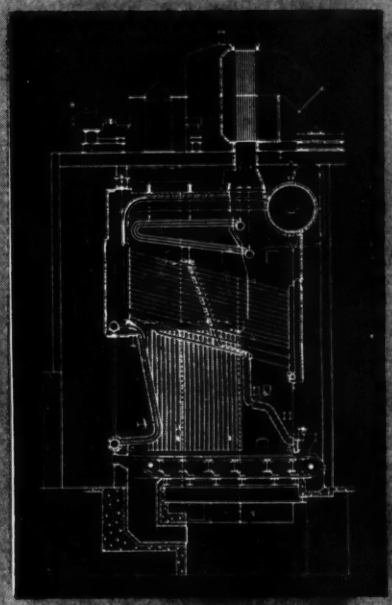


TYPE H STIRLING BOILER
A low-head moderate-pressure unit that is widely used in small industrial plants, institutions, hotels, office buildings and to meet other similar requirements. Available in capacities ranging from 1500 to 30,000 lb. steam per hr. and for firing with any fuel. The furnace, usually of refractory, provides the necessary degree of dependability.



INTEGRAL-FURNACE BOILER

The Integral-Furnace Boiler is a completely co-ordinated unit built in wide range of steam capacities and for pressures and temperatures required by the most up-to-date and efficient prime movers. It is designed to burn pulverized solid fuels, oil, or gas, singly or in combination, thus utilizing at high combustion efficiency the least expensive fuel obtainable in any locality.

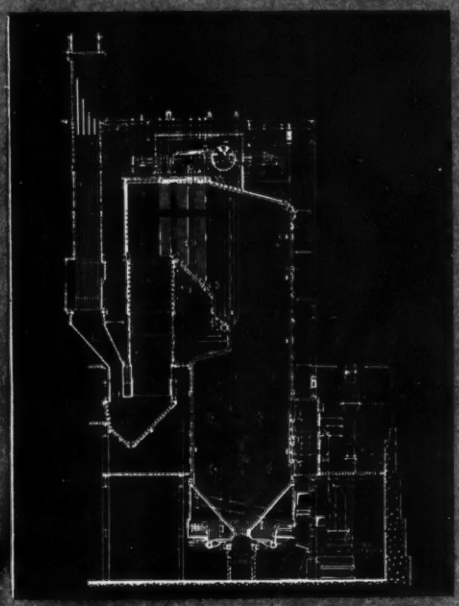


B&W CROSS-DRUM BOILER

This straight-tube sectional-header boiler is noted for its dependability, long life, and ability to deliver dry steam at high ratings. Can be readily inspected and cleaned.

CENTRAL-STATION BOILERS

High-duty boilers for central-station service are available in several basic designs to meet the requirements of individual stations. The Radiant boiler unit illustrated is typical of some of the units now operating at high rates in utility plants.



Water-Tube Boilers, for Stationary Power Plants, for Marine Service . . . Water-Cooled Furnaces . . . Superheaters . . . Economizers . . . Air Heaters . . . Pulverized-Coal Equipment . . . Chain-Grate Stokers . . . Oil, Gas and Multifuel Burners . . . Seamless and Welded Tubes and Pipe . . . Refractories . . . Process Equipment.

BABCOCK & WILCOX

THE BABCOCK & WILCOX CO.
85 LIBERTY STREET, NEW YORK 6, N.Y.

G-315T

Sorg Ltd. Plans $1,500,000 Improvement

VANCOUVER, B. C., December 22, 1945—Expenditure of $1,500,000 on a program of mill improvements and expansion is to be undertaken in British Columbia by the Sorg Pulp Company Ltd., according to H. M. Lewis, vice-president and general manager. Work will start immediately on the project, which will take three years to complete. The company is a Canadian subsidiary of the Sorg Paper Company of Middletown, Ohio, and the work involves the improvement of the existing holdings of the company at Port Mellon.

Mr. Lewis said directors of both companies at a recent meeting had authorized him to proceed with major improvements, which include the following: A modern chemical recovery plant of 150 tons capacity, being manufactured by Combustion Engineering Corporation Ltd., Montreal, with major parts manufactured in Vancouver shops; additional steam turbo generator units; a modern pulp washing system of the Swenson Nyman type; additional vacuum evaporator units of a type not yet decided upon; sawmill improvements which include the installation of hydraulic barking equipment.

Moser Staff Grows Again

CHICAGO, Ill., December 19, 1945—R. D. Ross has joined the sales staff of the Moser Paper Company. Before the war Mr. Ross was affiliated with R. R. Donnelley & Sons and recently was with the War Production Board serving as chief of the commercial printing section of the Printing and Publishing Division. Lieutenant Commander P. A. Van Vlack, Jr. has returned after serving three years in the Aleutians and the Atlantic. Mr. Van Vlack resumed his position with the Moser Paper Company on December 1st.

Wholesalers Business Rises

WASHINGTON, D. C., December 15, 1945—Wholesalers' sales of paper and paper products totaled $73,500,000 for the first ten months of 1945, the Bureau of Census has reported, based on figures from representative firms. This is a gain of two percent above the corresponding period of 1944. October sales were $6,396,000, a rise of 20 percent from September, 1945, and four percent higher than for October, last year. Inventories were unchanged from September and 7 percent less than for October last year.

Powell River Buys Aero Timber Rights

VANCOUVER, B. C., December 17, 1945—Purchase of the rights of the former Crown company Aero Timber on Queen Charlotte Islands on the northern British Columbia coast by the Powell River Company, has been revealed recently at Ottawa. The pulp and paper company has been understood to have bought all rights for $950,000. Included in the deal is 400,000 acres of standing spruce, cedar and hemlock.

Shor Returns to Triangle

COVINGTON, Ky., December 22, 1945—Major S. David Shor, Air Corps has returned to his position as vice-president of the Triangle Bag Manufacturing Company after three and one-half years' service in the American and European Theatres of operation.

Union Bag Adopts New Scale

SAVANNAH, Ga., December 24, 1945—According to announcement by T. T. Dunn, resident manager, hourly paid employes in the Savannah plant of the Union Bag and Paper Corporation will receive a 13 per cent increase in wages when they return to the shorter work week, under an agreement reached by management and representatives of plant unions.

"The 13 per cent increase," Mr. Dunn explained, "is in addition to a two and one-half cents per hour increase in the base rate, which is being given in lieu of the shift differential now in force.

"It has not yet been determned when the Savannah plant of Union Bag & Paper Corporation will go to the shorter work week. "However, according to present plans, the change will take place just as soon as it is possible to readjust the work schedules and enlarge the operating personnel staff."

Strathmore Reelects Zink

WEST SPRINGFIELD, Mass., December 22, 1945—John D. Zink of Longmeadow has been reelected president of the Strathmore Paper company at its annual meeting. All other officers were re-elected.

URGES MORE INCENTIVE

(Continued from page 10)

of wrapping paper as saying that U. S. production had decreased from 2,778,000 tons in 1941 to 2,559,000 in 1945 and warned that it would continue to decrease because of OPA's failure to permit general price increases. He was quoted as saying that "OPA has been sitting in the road, obstinately refusing to advance the ceiling prices and as a result all the mills are shifting to production of finer grade papers in order to make money." He warned that OPA policies will result in smaller supplies of wrapping paper in retail stores until imports from the Canadian mills take up the slack—taking the market away from American mills.

A second company is quoted as saying that it had quit production of super-standard wrapping papers after 30 years of service, because of OPA policies. A third stated that "another result of OPA policies is that mills will not expand their operations because of their inability to make money, particularly the mills producing coarse paper."

OBITUARY

James Norman Blackley

LOUISVILLE, Ky., December 20, 1945—James Norman Blackley, age 52 years, died Tuesday evening December 18, 1945. Mr. Blackley was a Vice President of the Louisville Paper Company and had been associated with it since 1911; he had been manager of the Memphis branch since 1929.

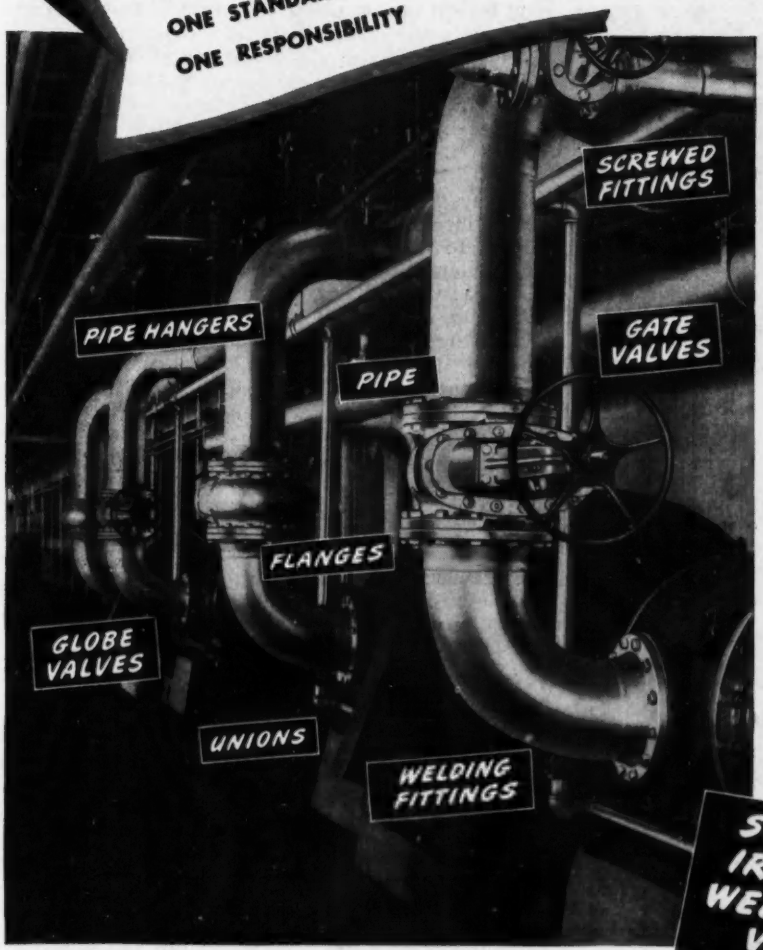
He is survived by his wife, Marguerite (Robinson) Blackley, two sons, Pvt. James Norman Blackley, Jr., Philippine Islands, and Winston Harley Blackley, Memphis, also two sisters, Mrs. Stewart Anderson of Lexington, and Miss Nannie Blackley of Louisville.

Curtis E. Hilkie

Curtis E. Hilkie, works manager of the Celotex Company for the last eight years, died at Metuchen, N. J., December 20, in his home at 76 Highland avenue. He was 61. He leaves a widow and a son.

"User's Choice" of Piping Materials in the Complete Crane Line

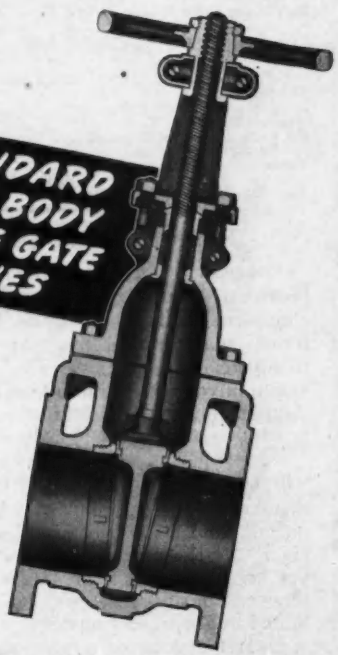
ONE SOURCE OF SUPPLY
ONE STANDARD OF QUALITY
ONE RESPONSIBILITY



● Piping systems operate under varying conditions. What conditions should dictate your choice of piping materials, you can best determine. Then Crane helps you meet those specific requirements with the world's largest line of valves, fittings, pipe and piping accessories for all applications. By demonstrating the merits of all types of materials, Crane, with 90 years' experience, enables you to choose correctly for every need.

Ordering from the Crane line simplifies all piping jobs. Your Crane Branch or Wholesaler supplies all materials. You're sure to get a better installation and better performance with all parts of uniform quality, backed by single responsibility. This complete Crane service is *made-to-order* for your peacetime program.

Pipe Connections at Pumps



SERVICE RECOMMENDATIONS: **Crane Standard Iron Body Wedge Gate Valves** are suited for many process and power services in pulp and paper mills, at all working pressures up to 125 pounds steam. Brass-trimmed valves are recommended for steam, water or oil lines: all-iron valves for oil, gas or fluids that corrode brass but not iron. Made in O.S. & Y. and in Non-Rising Stem patterns. See page 101 of your Crane Catalog.

WORKING PRESSURES

Size of Valve	Screwed or Flanged End Valves		Hub End Valves
	Saturated Steam	Cold Water, Oil or Gas, Non-Shock	Cold Water or Gas Non-Shock
2 to 12 in.	125 pounds	200 pounds	200 pounds
14 and 16 in.	125 pounds	150 pounds	150 pounds
18 to 24 in.	*	150 pounds	150 pounds

*For steam lines larger than 16-in., Crane 150-Pound Cast Steel Gate Valves are recommended. (For sizes under 2-in., use Crane Clamp Gate Valves.)

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CRANE VALVES • FITTINGS • PIPE
PLUMBING • HEATING • PUMPS

FINANCIAL NEWS

New York Stock Exchange

High, Low and Last for Week Ending December 22, 1945

STOCKS

	High	Low	Last
A. P. W.	8⅛	8	8⅛
Armstrong Cork Co.	54¾	53	54¾
Celotex Corp.	23¼	22¼	23¼
Celotex Corp., pf.	20⅞	20¼	20¾
Certain-Teed Products Corp.	15¾	14⅝	15⅛
Certain-Teed Products Corp., pf.	109	108	109
Champion Paper & Fibre Co.	51	49	50
Champion Paper & Fibre Co., pf.	110	110	110
Congoleum Nairn Co.	35½	33¾	34⅛
Container Corp. of America	39½	37	39½
Continental-Diamond Fibre Co.	16½	15⅝	16
Crown-Zellerbach Co.	29½	28⅝	29¼
Crown-Zellerbach Co., pf.	107½	106¾	107
Dixie Cup Co.	48½	46⅞	47½
Dixie Cup Co.—A	54½	54	54½
Flintkote Co.	36¾	35⅛	36¼
Flintkote Co., pf.	111	110	111
Robert Gair	9⅞	9⅛	9⅞
Robert Gair, pf.	19¼	18¾	19¼
International Paper Co.	44⅝	41	44½
International Paper Co., pf.	114¾	112	114¾
Johns-Manville Corp.	140½	137	139
Johns-Manville Corp., pf.	135	135	135
Kimberly-Clark Corp.	66⅛	64½	66⅛
MacAndrews & Forbes	37½	37½	37½
MacAndrews & Forbes, pf.			
Masonite Corp.	60	57	57⅛
Mead Corp.	23½	20½	21¾
Mead Corp., pf. A—6%	105½	105½	105½
Mead Corp., pf. B—5½%	105	103⅜	104
National Container Corp.	31¾	27½	30
Paraffine Companies, Inc.	76	76	76
Paraffine Companies, Inc., pf.			
Rayonier, Inc.	22⅞	20⅞	22⅞
Rayonier, Inc., pf.	38	37¾	38
Ruberoid Co.	45	43½	45
Scott Paper Co.	54½	52½	53½
Scott Paper Co., pf.			
Sutherland Paper Co.	40¼	40¼	40¼
Union Bag & Paper Corp.	25½	24	24⅜
United Paperboard Co.	12⅜	11⅝	11⅞
U. S. Gypsum Co.	114½	111¾	112
U. S. Gypsum Co., pf.	195	195	195
West Virginia Pulp & Paper Co.	38⅜	36¾	37½
West Virginia Pulp & Paper Co., pf.	112½	112½	112½

BONDS

Abitibi Pulp & Paper Co. 5s '53	105¾	104¾	105⅛
Celotex Corp. 3¾s '55			
Certain-Teed Products Corp. 5½s '53			
Champion Paper & Fibre Co. 3s '65			
International Paper Co. 6s '55	107½	107	107⅛
International Paper Co. 5s '47	103¾	103	103¾
Mead Corp. 3½s '53			

New York Curb Exchange

High, Low and Last for Week Ending December 22, 1945

STOCKS

	High	Low	Last
Great Northern Paper Co.	46	42	42
Hummel-Ross Fibre Corp.	13¼	12⅜	12⅝
St. Regis Paper Co.	11⅛	10⅜	10⅝
St. Regis Paper Co., pf.			
Taggart Corp.	10	9	9⅜

BONDS

American Writing Paper Co. 6s '61			

Report Hearst Seeks Pejepscot

PORTLAND, Me., December 21, 1945—Plans are reported to be underway here for the purchase of the Pejepscot Paper Company in Topsham by Hearst interests, magazine and newspaper publishers, according to financial authorities. The negotiations which are said to involve "several million dollars," would call for the expenditure of close to a million dollars for modernization and expansion, the report goes.

The Topsham mill, makers of newsprint until 1942 when it converted to specialty papers, controls the Androscoggin Water Company which has maintained important hydro-electric facilities on the Androscoggin river. If the proposed sale is consummated, it is not yet known whether the Hearst group will buy the power company interests, or whether it will be retained by its present owners.

Hearst negotiated a year ago for the Maine Seaboard Company in Bucksport, recently sold to Time, Inc., but withdrew its offer last June, according to testimony brought out at the reorganization hearing of the New England Public Service Company, previous owners of the Maine Seaboard Company.

Announces Paper Mills Assessments

[FROM OUR REGULAR CORRESPONDENT]

GLENS FALLS, N. Y., December 24, 1945—Paper manufacturing firms in this section have been notified of their tax levies for the year in connection with the construction and maintenance of the Sacandaga Reservoir. The huge reservoir was completed several years ago by the Hudson River Regular Board at a cost of about $12,000,000 and has already proven of great benefit during periods of drouth. In Washington County the maintenance levy shows the United Paper Board Company assessed for $1,008.40; Fort Miller Pulp and Paper Company, $683.40; Hudson River Power Corporation, International Paper Company Company and Marinettee Paper Company, $4,539; Union Bag and Paper Power Corporation, $5,719.65. For construction the United Paper Board Company, and unknown owners, are levied $7,654.61; Fort Miller Pulp and Paper Company, $4,719.56; Hudson River Power Corporation, International Paper Company, and Marinette Paper Company, $1,737.55; Union Bag and Paper Power Corporation, $39.499.90.

In Warren County the construction levies are Finch, Pruyn and Company, $18,455.59; Moreau Manufacturing Company, Queensbury, $704.41; Hudson River Power Corporation and International Paper Company, Queensbury, $49,167.96; Hudson River Power Corporation and International Paper Company, Luzerne, $1,115.32; Warren Curtis Manufacturing Company, $452 and International Paper Company, Hudson River Power Corporation, Luzerne, $7,202.61. For maintenance Finch Pruyn and Company is levied $2,672.40; Moreau Manufacturing Company, $102; Hudson River Power Company and International Paper Company, Queensbury, $7,119.60; Hudson River Power Company and International Paper Company, Luzerne, $161.50; Warren Curtis Manufacturing Company, $65.45 and Hudson River Power Company, International Paper Company, $1,042.95.

Fibreboard Products Improves Plant

SAN FRANCISCO, December 10, 1945—In step with the post-war industrial development of the Pacific Coast, Fibreboard Products, Incorporated, is spending more than one million dollars in modernizing its paper mill and converting plant in Antioch, Cal., for the more efficient production of cartons and shipping containers. The program calls for the addition of high-pressure boilers and two turbines in the power plant, enlarging the converting plant for making shipping containers and the carton plant where folding cartons, pails and fruit packing materials are manufactured.

The Antioch plant is one of the oldest paperboard mills on the Pacific Coast, having been established more than fifty years ago, and is one of the six board mills and eight converting plants of Fibreboard Products strategically located to serve the three major industrial areas of the Pacific Coast.

Board mills are located at Antioch, Stockton, Los Angeles and Vernon, California, and at Port Angeles and Sumner, Washington. Converting plants are located at San Francisco, Antioch, Stockton, Los Angeles and Vernon, California, Port Angeles and Sumner, Washington, and Portland, Oregon. Fibreboard also operates Federal Container Company at Philadelphia and the Maryland Container Company at Baltimore.

DEPTH OF ANY LIQUID

Automatically measured and recorded

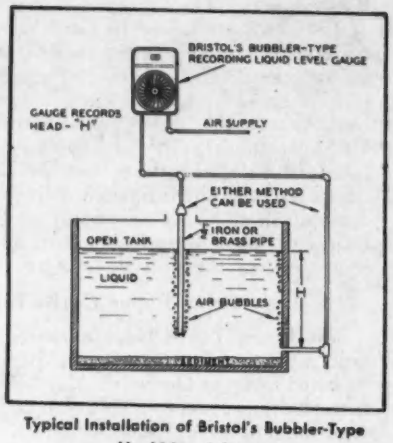
Bristol's Model 40M Liquid Level Recording Gauge — also available for flush-panel mounting.

Bristol's Liquid Level Gauges accurately show and keep a permanent record of the level of any liquid — in open or closed vessels.

Float, pressure-bulb, pressure, air-bubbler, and differential type liquid level gauges are offered in all ranges of application.

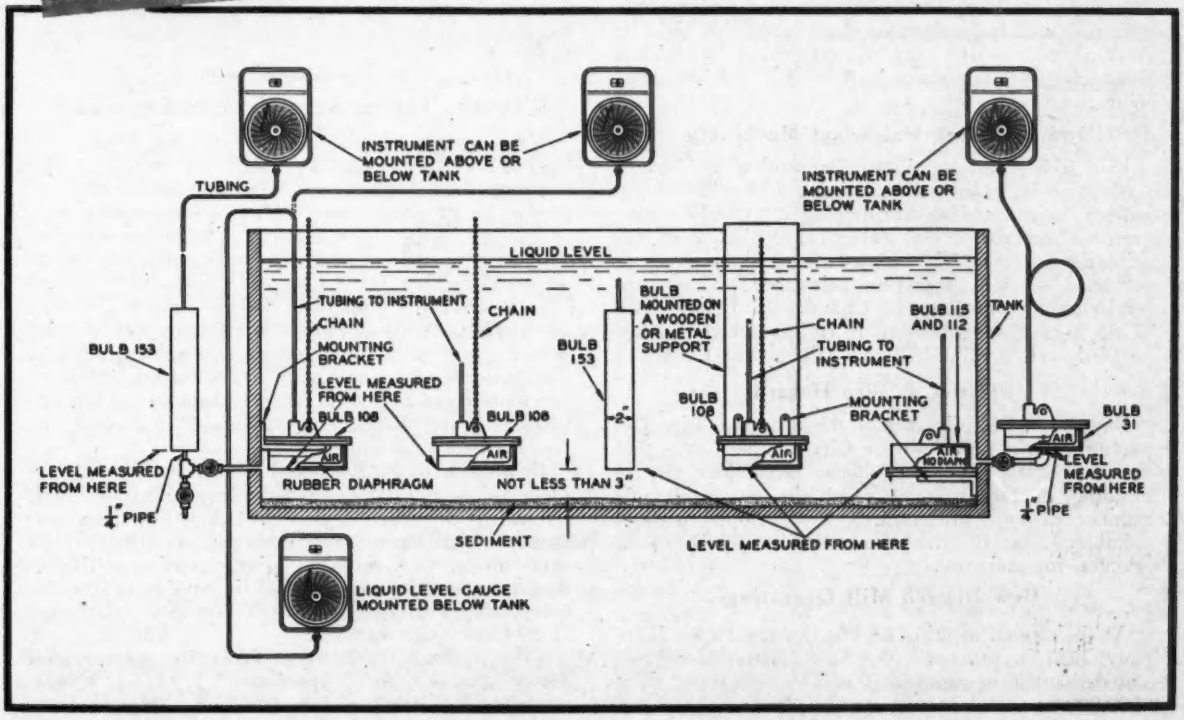
Automatic Controllers in both electric and air-operated models are also available.

The diagrams show typical methods of installing liquid level gauges. Further information on Bristol Liquid Level Gauges is given in Bulletin L700. Address The Bristol Company, 159 Bristol Road, Waterbury 91, Conn. U.S.A. The Bristol Company of Canada, Ltd., Toronto, Ontario. Bristol's Instrument Co., Ltd., London N.W.10, England.



Typical Installation of Bristol's Bubbler-Type Liquid Level Gauge

Engineers process control for better products and profits



MORE NEWSPRINT EXPECTED IN 1946

(Continued from page 7)

1946 with the 230,000 tons a month allocated from Canada in the final quarter of 1945.

"It is wrongly thought," says the Association, "that this may allow a similar increase in 1946 ordering and consumption. The facts are that in the final quarter of 1945 orders received by Canadian mills from U. S. customers have amounted to 243,000 tons a month, against the 230,000 tons of allocation, and that permissive consumption has exceeded orders by 2½ per cent, or a further 6,000 tons a month. The apparent U. S. consumption of Canadian newsprint in the final quarter of 1945 has thus been 249,000 tons a month, compared with the estimated delivery of 250,000 tons a month in 1946. Thus supply in 1946, as presently estimated, provides no safe margin, and justifies no increase over the present level of total orders."

Print Paper Curbs Lifted

The Prices Board has announced that orders governing the distribution of print paper in Canada will be lifted as from December 31. Meanwhile, as far as newsprint is concerned, directives have been issued assuring publishers and printers a supply of newsprint after that date equal to but not exceeding their quotas during the last quarter of 1945. Nothing was said about price control, but as the Government regards the danger of inflation as even more threatening now than during the war, it is presumed that prices for all kinds of paper will remain pegged at the base level of 1941, even though this involves payment of subsidies to manufacturers in certain cases. At the end of the present year the services of the technical advisers and industry advisory committees which fostered the co-operation of the printing industry in the formulation and application of board policies will also be discontinued, and the deputy administrator, Travice A. Tod, who has been on loan to the Prices Board from the Canadian Lithographers Association, will leave the Board to devote his time to other activities. It is understood that John Atkins, Newsprint Administrator, will remain for the time being.

India Seeking Pulpwood Machinery

Five Indian industrialists, representing 140 Indian states, are in Montreal examining Canadian heavy industry with the idea of adapting it to India's program of reconstruction. They state that they are primarily interested in pulpwood machinery and its purchase here will depend on their report. They form a mission appointed by the Chamber of Princes, one of the highest organizations in India, and are headed by Sirdar H. S. Malik, Prime Minister of Patiala.

Plastics as Fire Hazard

Raymond Pare, director of the Montreal Fire Department, in a report to the City Council, says that the many new types of plastics and their use in building operations may result in a considerable number of new fire hazards if developed without suitable study of fire prevention methods to be adopted for their use.

New Dryden Mill Operating

At the annual meeting of the Dryden Paper Company, held in Montreal, F. A. Sabbaton, president, stated that the new mill was now in operation. The $500,000 or $600,000 put into the plant last year was already effecting an improvement in the costs of manufacture, the expected savings far exceeding earlier anticipations. The company, however, was hampered by controls both as to prices and tonnage, with labor costs still rising. However, he felt that the current fiscal year should show a considerable improvement over the past year in operating results. The report for the year ending September 30, 1945, was adopted and directors were re-elected for the ensuing year.

Wayagamack Signs Contract

According to a despatch from Three Rivers, Que., the Wayagamack Pulp and Paper Company has signed a union contract with the locals of the International Union of Pulp and Sulphite Workers, following a two-week negotiation period. The company is a unit of Consolidated Paper Corporation, and manufactures newsprint, wrapping paper and kraft pulp.

Pulpwood Labor Outlook Uncertain

TORONTO, Ont., December 3, 1945—Notwithstanding the intensive campaign by both Provincial and Federal governments to get more men to go into the woods for pulpwood cutting, it seems likely here that there may not be as many men in the woods by Christmas time as there were last year. The return of so many men from overseas, together with the slackened industrial activities was thought to favor the woods situation this year, but unskilled young men, who would normally be expected to take work in the camps, express a reluctance to take the work, chiefly because of the isolation involved. As one young man, just returned from Europe, expressed it: "Is this what we have to come back to? After the promises made to some of us to induce us to go into the army —promises of better opportunities—surely we are entitled to expect useful employment somewhere more congenial for young people than the isolation of a lumber camp." Another said: "There isn't so much difference between an army camp or barracks and a lumber camp, and we have had enough of that for some time. Now that we have finished the job over there we want to enjoy a little social life as well as work."

Crystal Tissue Sets Up Pension Plan

MIDDLETOWN, Ohio, December 24, 1945—The Crystal Tissue Company and its affiliate, the Crystal Waxing Company, have announced to their employees a Pension Trust Plan that is one of the first of its kind in the paper industry. In order to assure employees of retirement income at age 65, Crystal has set up a Pension Trust with the Connecticut Mutual Life Insurance Company. Benefits under the plan are available to all employees over the age of 30 and with 5 years or more of service with the company. The benefits under the plan are based on length of service and compensation of each employee. The entire cost of the plan is being carried by the company at no expense to the employees.

In addition to the Pension Trust, E. E. Grant, President of The Crystal Tissue Company, and L. J. Long, President of The Crystal Waxing Company announced that upon retirement the company would carry on for each employee a large portion of the industrial insurance now carried by employees and the company. This would be carried on after retirement at the company's expense.

To administer the Pension Trust the company and the insurance company appointed L. J. Long, Executive Vice President, Melvin B. Henry, Personnel Director and Albert Hall, Stores Department, as trustees of the fund.

ROLLS

"round and straight to within one-half of one ten-thousandth inch"

This reverse coating roll was ground to within 1/40,000 inch of absolute roundness and straightness. The initial checking by a Farrel Indicating Caliper was followed by two checks of 288 readings each on electromatic gauges under controlled temperature conditions.

Requests for rolls ground so close to absolute accuracy are a rarity in any roll shop. But the ability—that is, the experience, the facilities and the highly skilled personnel—for producing such rolls is *always* available in *America's largest specialty roll shop* at Ansonia, Connecticut.

Here there are casting pits large enough to accommodate rolls up to 36 feet in total length . . . an assortment of "chills" that make it possible to cast rolls from 5 to 72 inches in diameter and any face length up to 312 inches . . . special tools for machining . . . precision roll grinders of our own design . . . special calipering instruments for checking accuracy as finishing progresses . . . and engineers, founders and machinists with the necessary skill and experience to bring your specifications to "life".

When you need rolls, do as so many mills have been doing for nearly a century—call Farrel. *Write for information on rolls for specific applications or for details of any of the other products listed on this page.*

FARREL-BIRMINGHAM COMPANY, INC. • ANSONIA, CONN.

Plants: Ansonia, Derby and Stonington, Conn., Buffalo, N. Y.
Sales Offices: Ansonia, Buffalo, New York, Pittsburgh, Akron, Los Angeles, Tulsa, Houston, Charlotte

FARREL PAPER MILL MACHINERY

ROLLS: Chilled Iron, Dry Sand, Meehanite, Alloy Iron, Steel, Chromium-Plated

FOR: Calender Stacks
Board Calenders
Super Calenders
Glassine Calenders
Friction Rolls
Breaker Rolls
Smoothing Rolls
Coating Rolls
Creping Rolls
Plater Rolls
Cutting Rolls
Paraffining and Waxing Rolls
Saturating Rolls
Silicating Rolls
Miscellaneous Special Purposes

CALENDERS: Paper and Board
GRINDING MACHINES: Roll
CALIPERS: Roll
GEARS, CUT: Spur, Single and Double Helical (Farrel-Sykes Continuous Tooth Type)
SPEED REDUCING GEAR UNITS
SPEED INCREASING GEAR UNITS
FLEXIBLE COUPLINGS.

Farrel-Birmingham

FB-224

North Carolina Finds Labor Short

WILMINGTON, N. C., December 20, 1945—J. F. Graham, district wood supervisor of the International Paper Company at Georgetown, S. C., said in an interview here yesterday that an acute labor shortage is hampering the pulpwood cutting industry in southeastern North Carolina. "Acute now," Mr. Graham declared, "the situation will become worse in March when the Army removes from this area some 500 German prisoners of war now engaged in the work."

Mr. Graham pointed out that this section of the State normally supplies about 25 per cent of North Carolina's pulp logs, and that North Carolina logs, in turn, supply about one-third of the total consumed by the pulpwood industry in the two Carolinas. "We are finding that more than one-half of the men being referred to us for employment by the United States Employment Service simply don't want to take the jobs offered, despite the pay scale ranging from $6 to $8 a day, plus transportation," Mr. Graham declared.

Mr. Graham's statement came within 24 hours of a declaration by the local USES office that its unemployment compensation claims were increasing steadily.

U.S.E.S. Seeks Labor for Mead

MACON, Ga., December 19, 1945—The United States Employment Service here is engaged in enlisting several thousand employes, skilled and unskilled, for the paper and pulp mill to be established here by the Mead Corporation. Officials say that a large number of workers are needed, and that efforts are being started in time to get the necessary force recruited before the firm comes here for business.

Publishers to Help in Emergency

NEW YORK, N. Y., December 19, 1945—The daily newspapers of New York City have unanimously endorsed the plan of regional and state newspaper associations to care for any newspaper in distress because of lack of newsprint to publish next year. Text of the statement of the publishers follows:

"The members of the Publishers Association of New York City commend the plans proposed by various regional and state associations to make sure that there is a sufficient supply of newsprint available so that no recognized daily or weekly newspaper need suspend publication for lack of newsprint. They further endorse the proposal to set up on a regional and state basis a plan for enabling newspapers, which may have been unable to get an assured source of supply under contract, and as a result are in distress for lack of newsprint, through no fault of their own, to issue an eight page paper.

"The members of this Association through this statement announce that they will cooperate in helping make sure that the purpose of this nation-wide movement that all newspapers continue publication within the limits of the available newsprint supply be attained."

Strathmore Negotiations Progress

WEST SPRINGFIELD, Mass., December 15—A meeting of officials of the Strathmore Paper company and the International Brotherhood of Papermakers, AFL, yesterday in an attempt to settle issues in dispute was termed "encouraging," by Fred Rochford, union organizer, who said that another meeting will be held shortly.

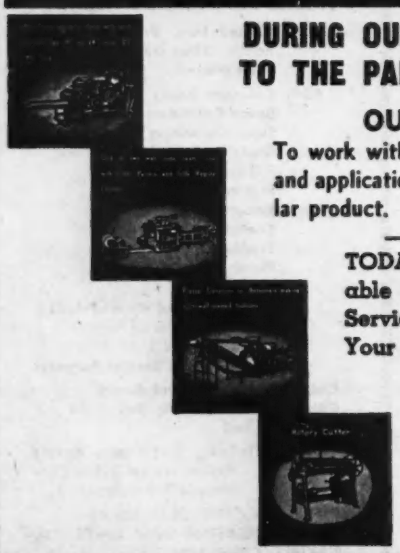
IN THIS DAY OF VICTORY! ***WE LOOK FORWARD WITH CONFIDENCE TO A FUTURE IN WHICH PEACE SHALL ABIDE.***

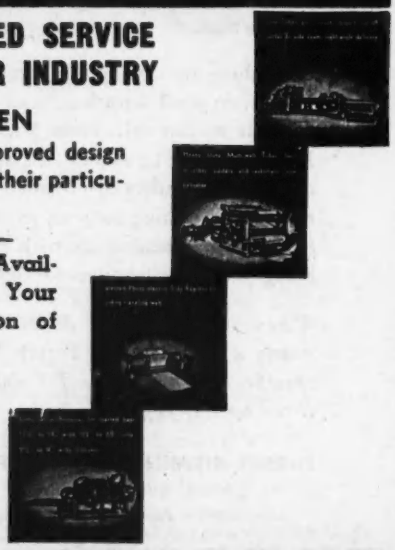
DURING OUR 117 YEARS OF CONTINUED SERVICE TO THE PAPER MILLS AND THE PAPER INDUSTRY

OUR HIGH PURPOSE HAS BEEN

To work with each individual customer through improved design and application to increase quality and production in their particular product.

TODAY—Our Engineering Department Available Manpower and Materials Are At Your Service for Reconditioning or Expansion of Your Equipment.





PAPER MACHINES—JORDANS
PAPER BAG MACHINES
NEW MODEL "E" PAPER MILL TRIMMER

THE SMITH & WINCHESTER
MANUFACTURING COMPANY
PLANT AND OFFICES AT SOUTH WINDHAM, CONNECTICUT

There's a POWELL VALVE for every service in the Paper Industry

125-pound Iron Body Bronze Mounted Non-rising Stem Gate Valve. Also available in All Iron.

200-pound Bronze Globe Valve with regrindable renewable seat and disc.

The Powell Line of Valves for every service in the Paper Industry includes bronze, iron and steel valves of every type and pressure needed to control flow in water and steam lines; a complete line of valves in pure metals and special alloys for process lines in which corrosive media are encountered; and, for handling viscous or gelatinous media or suspensions in solution that precipitate over seat and disc faces, Globe, Angle, and "Y" Valves equipped with the Powell Patented Seat Wiper—an internal regrinding device that assures a tight, metal-to-metal closure. Catalogs and details on request.

The Wm. Powell Co., Cincinnati 22, Ohio

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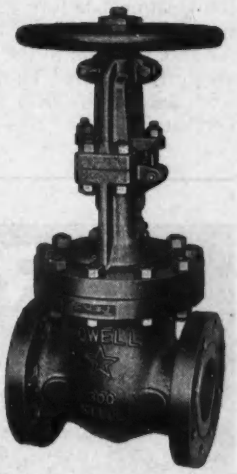


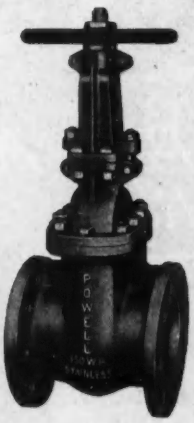
Class 300-pound Cast Steel O. S. & Y. Gate Valve.

125-150-pound Iron Body Bronze Mounted or All Iron "Master Pilot" Gate Valve.

250-pound Iron Body Bronze Mounted Regrinding Swing Check Valve.

200-pound Bronze Gate Valve with renewable disc.

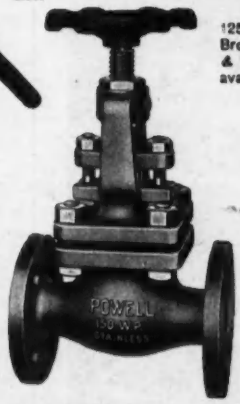
125-pound Iron Body Bronze Mounted O. S. & Y. Gate Valve. Also available in All Iron.



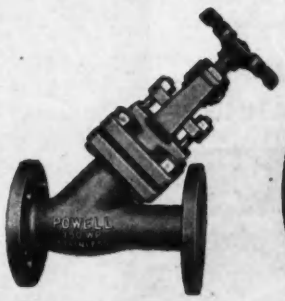
150-pound Stainless Steel O. S. & Y. Gate Valve.

Class 900-pound Cast Steel Swing Check Valve.

125-pound Stainless Steel O. S. & Y. "Y" Valve.



150-pound Stainless Steel O. S. & Y. Gate Valve.



150-pound Stainless Steel O. S. & Y. "Y" Valve.

125-pound Iron Body Bronze Mounted or All Iron O. S. & Y. Globe Valve.

POWELL VALVES

Wet Strength in Uformite

A new resin for wet strength improvement of paper, named Uformite 470, is announced by The Resinous Products and Chemical Company, of Philadelphia, Penna. This represents an entirely new type of urea-formaldehyde resin modification, and requires no special handling, aging, or pre-treatment before use. After dilution with water it is ready for immediate addition to the stock prior to sheet formation. The resin represents an advance over previous types in that it offers: superior retention and wet strength development on sulphite, rag, and groundwood stocks; high wet strength with all stocks at low acidity; effectiveness with minimum alum or acid alone as catalyst; and excellent durability of wet and dry strength.

In the development work to date with this resin, it has been found particularly effective in producing high wet strength glassine, towelling, light-weight absorbent tissues, sulphite wrapping papers, blue-print, map, chart, and ledger papers. In addition, consideration of Uformite 470 is recommended for all types of stock, including Kraft, in which it is desirable ot operate at a stock pH of 5.0 to 6.0, and where the optimum in permanence is required.

It is normally advisable to reduce the solids content of the resin with water to 5 to 10 per cent prior to addition to the stock, particularly if the resin is to be added close to the machine. For this purpose, the dilution water temperature should be 60° F. or slightly higher.

For optimum efficiency, it is desirable to add the resin after the Jordans, at such points as the headbox, screens, fan pump, etc. Although direct beater application may be employed, experience thus far has shown that such a procedure will result in a definite sacrifice in wet strength development.

If used in the production of a sized sheet, the resin solution may be added before or after the addition of resin.

Either alum or acids, such as hydrochloric and sulphuric, are used as catalysts. However, alum appears in most cases to be slightly more effective than acid alone at any given pH.

The quality of alum or acid to be used with the resin should be sufficient to reduce the pH of the stock at the head box to 6.0 or below. It will show effective retention and high wet strength development on all stocks over a pH range of 4.0 to 6.0, whether alum, acid or combinations of acid and alum are used to attain this stock pH.

In both laboratory and commercial experience with the resin, the importance of aging samples of treated paper prior to wet strength evaluation has been apparent, particularly when this resin has been used at the higher pH levels. It is not possible to obtain complete cure, and hence maximum wet strength development, directly off the machine. However, under the proper catalytic condition, i.e., stock pH at the head box of 6.0 or below, full cure will develop on aging at room temperature for 10 to 21 days. Accelerated aging, oven conditioning for 5 minutes at 220° F., of paper directly off the machine may be used as the method of control of wet strength production.

The physical properties of the resin are as follows:

Solids Content	40%
Solvent	Water-Alcohol (2.1)
pH	7.5 to 8.0
Specific Gravity	1.200 to 1.208
Pounds per gallon	10
Appearance	Water Clear

WARREN PUMPS
Warren Stock Pump
Type 2-SOD-11 and 3-SOD-11
Warren Stock Pump
Type 5-SOD-15 . . . 12" suction nozzle
For all Paper Mill Services including
Liquor Pumps in Sulphite, Soda and Kraft Mills
Pulp Stocks up to 7% density
Water pumps for Mill Supply, Showers, White water, Wash-down, etc.
Boiler feed and all other power-plant requirements.
CENTRIFUGAL
RECIPROCATING
Warren Double Suction Pump
Single Stage
Warren Machine Chest Pump
Warren Digester Liquor Circulator
Type 10-LS-19
Warren Liquor Pump, Type "L"
Single-stage, Single-suction
WARREN STEAM PUMP CO., INC.
WARREN, MASSACHUSETTS

Marathon Development Shows Progress

TORONTO, Ont., December 22, 1945—"We're just plugging along the best we can," reported Niels M. Anderson, vice-president in charge of the pulp and paper division of Marathon Paper Mills of Canada, when asked about progress at their new development at Marathon, formerly known as Peninsula, 180 miles east of Port Arthur, Ont., on the north shore of Lake Superior. Mr. Anderson said the labor situation had improved a little, but they could still add a few hundred more men to the approximately 1,000 men now working on construction.

Before work began on the $15,000,000 project in the spring of 1944, the place was only a small whistle stop on the railroad. There are about 1,000 residents there now and by the time the development is completed and the mill ready for production some time next summer, it is expected there will be a sizable new town of around 2,000 inhabitants with modern homes and all other civic facilities. One of the smartest buildings erected to date is the new Everest Hotel with accommodation for 30 guests. Work is also proceeding on a hospital, a public school and a department store. A recreation centre is planned, which will house a theatre, dance hall, bowling alleys, swimming pool and other attractions. A number of modern bungalows have been erected and nearly two hundred more projected.

When the mill is working to capacity, it will employ 350 men, apart from those engaged in woods operations, and will produce 300 tons of kraft pulp daily. The annual payroll should be about a million dollars. The pulp will be shipped by lake and rail to Rothschild, Wisconsin, for manufacture into packaging cartons, towels and similar products.

The main mill building is 660 feet by 188 feet and in addition there will be a large chip-storage building and a wood preparation plant, the latter 250 x 100 feet. More than half the steel has been erected and most of it is enclosed in concrete. Already some of the machinery has been installed. A 540 foot wharf is nearly completed.

To operate to capacity, 180,000 cords of wood will be required annually from the company's limits in the Pic River district and from Beardmore and Hearst.

K-C Plans Canadian Pulp Mill

NEENAH, Wis., December 27, 1945—Cola G. Parker, president of the Kimberly-Clark Corporation, disclosed yesterday plans for construction of a new mill and townsite in Canada through a wholly owned subsidiary, the Longlac Pulp and Paper Company, Ltd. The program calls for mill operations to begin early in 1948. Initial pulp-producing capacity has not been determined. Pulpwood for the new mill will come from an area under concession by the Department of Lands and Forests of the Province of Ontario. The pulp is expected to be suitable for book paper and creped wadding products.

Hooper Promotes Stewart

PHILADELPHIA, Pa., December 20, 1945—James T. Stewart has been named to sales manager of the Hooper Paper and Twine Company, effective January 1, 1946. Mr. Stewart joined the company June 10, 1929. He entered the U. S. Army in July, 1942 and after serving 18 months overseas, was honorably discharged in September, 1945.

B. C. to Study Insect Threat

VANCOUVER, B. C., December 20, 1945—Special survey of British Columbia forests to determine the extent of infestation by insects will be carried out if plans of the New Dominion Forest Insect Control Board materialize. Dominion entomologists have been working for several years studying insect ravages in B. C., but in order to plan effective control they must have information covering the bulk of the forest areas. Their studies to date have been localized.

C. D. Orchard, Deputy Minister of Forests, said the province has been fortunate in that outbreaks of insect pests have subsided through natural causes before damage became too widespread. Ontario and Quebec have not been so lucky and large areas have been devastated. However, a careful study by insect experts may enable this province to forestall serious inroads.

The plan may involve appointment of a number of insect inspectors, working with forest rangers, to make checks of all the large forest areas. They would report to the trained entomologists who would plot occurrence of the pests, check on the amount of damage and work out a control scheme.

Riedeberg Joins Westvaco Sales

Theodore (Ted) Riedeburg has joined Westvaco Chlorine Products Corporation, New York, as Technical Service Representative in charge of Westvaco insecticides and fumigants including D.D.T., methyl bromide and grain and soil fumigant mixtures. In his new capacity, Mr. Riedeburg will be available for consultation with executives, plant managers and sanitation engineers on problems concerning insect infestation. Mr. Riedeburg was, until recently, connected with Dow Chemical Company for three years developing methyl bromide and other fumigants for use in industrial and food-plant sanitation. His articles on food-plant sanitation and his technical work on infestation control have made him well-known in the drug, milling, diary and food fields throughout the United States and Canada.

Dow Extends Southeastern Territory

WASHINGTON, D. C., December 24, 1945—Extension of the area of the Washington sales office of The Dow Chemical Company to include Virginia, North and South Carolina, Georgia and Florida has been announced by Leland I. Doan, Vice-President and Director of Sales.

The move becomes effective January 1, Mr. Doan said, and the Washington staff is being augmented to handle the additional activity. The Southeastern territory involved has formerly been covered by the New York office.

Witham Covers South for Orr

PIQUA, Ohio, December 15, 1945—Effective as of January 1, 1946, the Orr Felt and Blanket Company representative in the south will be George L. Witham, 214 Upham Street, Mobile, Alabama. John L. Purdy, who has served the southern territory for over twenty years, will remain with the organization in Ohio and other mid-western states. Witham brings to his post the advantage of many years of both technical and practical experience in all types of pulp, paper and board mill operation.

Twisted or Braided ... equally effective

When you buy PALMETTO ... or any of the other Greene, Tweed Packings, whether in twisted form for valve stems, or braided for rods and shafts ... you can be SURE of a stuffing box seal that will be effective with least "pull-up" on the gland.

This is because of the many advantageous features of these packings ... their correct shape and size, their high quality yarns, their special lubricants, selected for specific services, and their self-lubricating qualities which keep them soft and pliable for long periods.

Write for descriptive literature on these distinctive packings.

GREENE, TWEED & CO.
BRONX BOULEVARD AT 238th STREET
NEW YORK 66, N. Y.
Plants at New York, N. Y. & North Wales, Pa.

PALMETTO
High Pressure Folded Asbestos Gaskets
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NOW AVAILABLE

PALMETTO
PALMETTO for steam, water, air • PELRO for oils • CUTNO for alkalis • SUPER-CUTNO (blue asbestos) for acids • KLERO for foods
Self-Lubricating **PACKINGS**

Speed P.O.E. Site for Westvaco Mill

CHARLESTON, S. C., December 20, 1945—United States Senator Burnet R. Maybank (D.-S.C.) has been assured of Army cooperation to pave the way for construction of a $5,000,000 additional plant by the West Virginia Pulp & Paper Company at Charleston.

"After conferences between representatives of the company, the real estate division of the army and Senator Maybank," says a special dispatch to the *Charleston News & Courier* from its Washington correspondent, "the Army agreed to release two warehouses at the Charleston Port of Embarkation property immediately and to issue a permanent permit to the company to start the plant. A proviso is made that the city and the South Carolina State Ports Authority both agree, in view of the fact that they are negotiating under surplus property laws for the entire Port of Embarkation property which includes the site of the proposed plant."

"The Senator believes," said the special dispatch to the local newspaper, "that the company can go ahead with its plans immediately after the first of the year. The action," he added, "will permit expansion of a great industry which will be of help to the farmers of Charleston."

"Heretofore," it was explained, "the company has had only a temporary permit for construction of the plant site."

Senator Maybank said that though States normally had priority to surplus government properties, the army was willing to make an exception in releasing part of the Port of Embarkation property to the West Virginia Pulp & Paper Company for two reasons. These are (1) the company's previous arrangement through a lease on the property from the city, and (2) the company's expansion program which will give employment both in construction and operation. Senator Maybank added that the expediting of the West Virginia's use of a portion of the property was agreeable to the State Ports Authority, which plans eventually to take over the rest of the Port of Embarkation.

Meanwhile, T. A. Cook, manager of the paper plant here, was quoted as saying he had "no comment" to make upon the special dispatch to the *News & Courier* from its Washington correspondent.

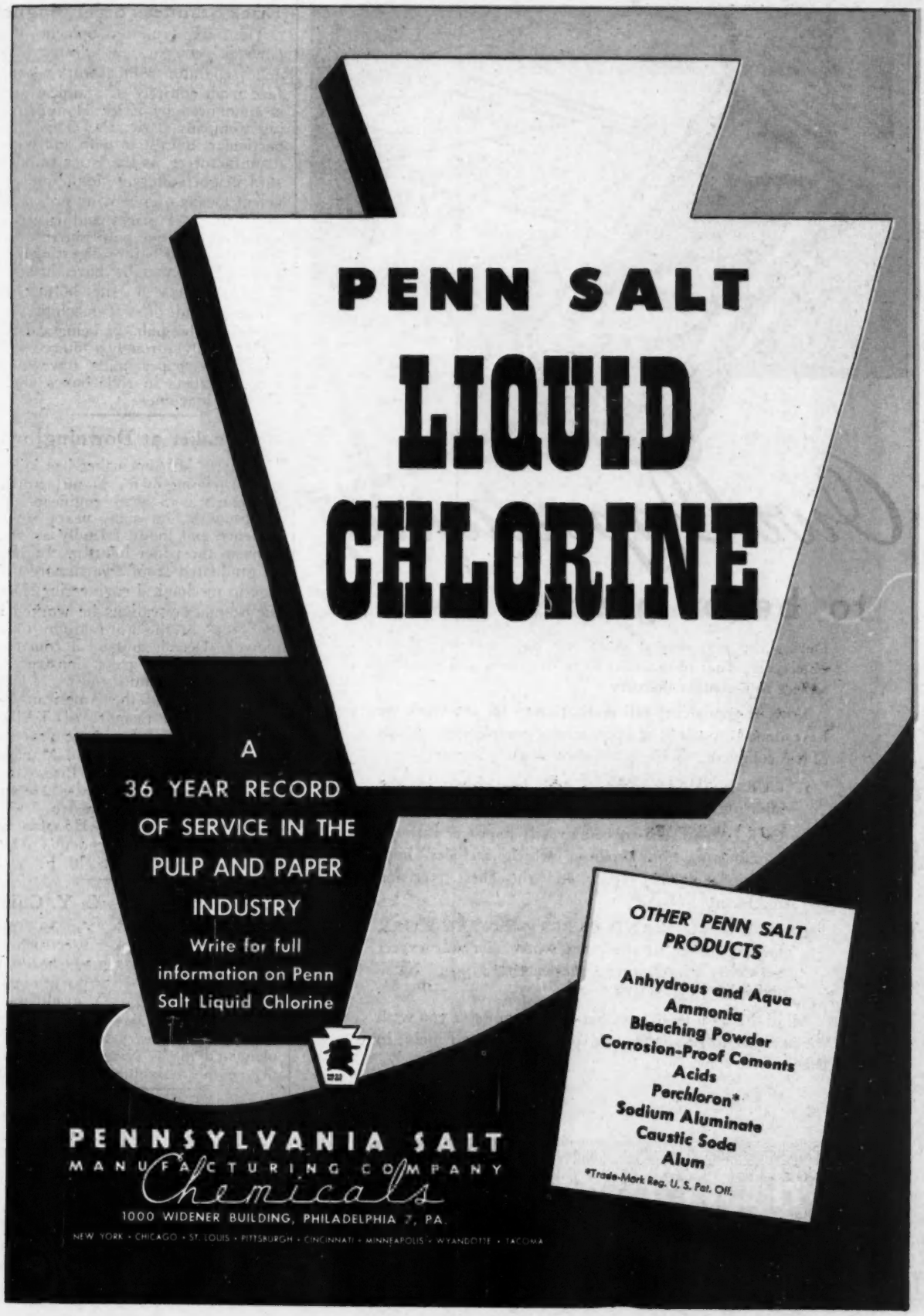
Pulp Consumers Fill Vacant Offices

RIDGEFIELD PARK, N. J., December 22, 1945—Arnold B. Huyssoon, vice-president of the Continental Paper Company, was selected vice-president of the Association of Pulp Consumers, Incorporated, at a directors' meeting held in Chicago. Mr. Huyssoon succeeds Thomas E. Morriss, who resigned as vice-president of the Association on September 1, when his resignation as vice-president of the Central Fibre Products Company, Chicago, Illinois, became effective.

F. W. Brainerd of the Scott Paper Company, Chester, Pa., was selected a director of the association to fill the vacancy created by Mr. Morriss' resignation.

Pulp Importers Elect Westad

NEW YORK, December 17, 1945—The Association of American Wood Pulp Importers at their annual meeting at the Stockholm Restaurant elected the following officers for the forthcoming year: President, Rolf G. Westad; Vice-president, J. Lindroth; Treasurer, V. Ramsay; Secretary, G. F. Baine; Director, A. J. Pagel.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LIQUID
CHLORINE
A
36 YEAR RECORD
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Salt Liquid Chlorine
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Anhydrous and Aqua
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Bleaching Powder
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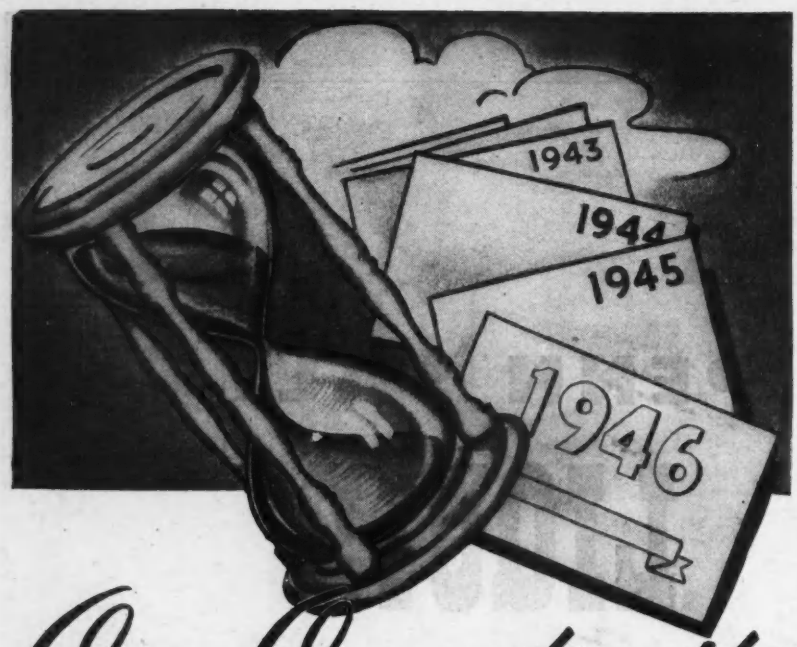
Caustic Soda
Alum
*Trade-Mark Reg. U. S. Pat. Off.
PENNSYLVANIA SALT
MANUFACTURING COMPANY
Chemicals
1000 WIDENER BUILDING, PHILADELPHIA 7, PA.
NEW YORK • CHICAGO • ST. LOUIS • PITTSBURGH • CINCINNATI • MINNEAPOLIS • WYANDOTTE • TACOMA



Our Opportunity

to be of greater service

During the past several years, we have had one major objective. That objective is to be of greater and growing service to the paper industry.

Now, it approaches full realization — for the work we have done towards it is approaching completion. Much of it is complete. It has taken three distinct forms:

1. OUR ENGINEERING STAFF has grown by the addition of top-flight personnel.
2. OUR FACILITIES are being vastly improved through a modernization program which includes both additional factory space and the finest precision machinery.
3. OUR DESIGN AND EXPERIMENTAL WORK has progressed to the point where you may expect extremely interesting announcements of NEW PRODUCTS — SOON.

All of this adds up to a greater capacity to serve you with the finest in mill equipment in 1946 — and increasingly, in the years to come.

CHENEY BIGELOW

Fourdrinier Wires · · Dandys · · Cylinders · · Wire Cloth

CHENEY BIGELOW WIRE WORKS · 417 LIBERTY STREET · SPRINGFIELD, MASS.

Eriez Stainless Steel Magnet

The successful development of a powerful, compact, non-electric magnetic separator with a working surface made entirely of stainless steel is announced by Eriez Manufacturing Company, Erie, Pa. This is of particular interest to pulp and paper manufacturers, as the Eriez stainless steel magnet offers a simple and efficient means of removing occasional iron and steel pieces and rust and metal scale from pulp slurries (or from the wood before digesting).

Many paper mills have installed Eriez magnets in the bottom of sluices ahead of wet machines—or wherever the pulp is being carried rather thinly through a sluice, pipe, etc. Some paper mills have used Eriez magnets in riffle boxes ahead of paper machines.

Shoemaker at Downingtown

William M. Shoemaker has joined the Downingtown Manufacturing Company as a staff engineer. He brings with him many years of experience and many friendly associations in the paper industry. In 1917 he graduated from Swarthmore College in mechanical engineering. During summer vacations he worked in the shops of the Ford Motor Company in Detroit and on a construction job for the Turner Construction Company in Buffalo.

He belongs to the American Legion and is a member of TAPPI where he served for three years as chairman of the Industrial Management Committee and for three years on the Executive Committee. He was chairman of the Delaware Valley Section for one year. He also belongs to the Superintendent's Association and to the A. S. M. F.

Hooker Assigns C. Y. Cain

NIAGARA FALLS, N. Y., December 22, 1945—The Hooker Electrochemical Company has assigned Charles Y. Cain to the sales territory in the vicinity of Chicago. A graduate of the University of Maine, he has spent a number of years in the Niagara plant and in the Niagara sales office prior to his assignment as a salesman.

Powers Union Celebrates

SPRINGFIELD, Mass., December 22, 1945—The ninth annual Christmas party of the Powers Paper company union, which was attended by Philip Powers, president of the company, and Harry P. Hogan, president of the Central Labor union, was held at the Hotel Highland. William Illig was chairman of the committee on arrangements.

BLEACHING

AMERICAN INDUSTRY'S CORRESPONDENCE PAPER AND BUSINESS FORMS TO MAXIMUM WHITENESS IS JUST ONE OF THE IMPORTANT PROCESSING OPERATIONS IN WHICH DIAMOND LIQUID CHLORINE HAS BEEN SO SUCCESSFULLY USED OVER THE YEARS. AVAILABLE IN SINGLE UNIT OR MULTI-UNIT TANK CARS AS YOUR REQUIREMENTS DEMAND.

DIAMOND ALKALI COMPANY
PITTSBURGH, PA. AND EVERYWHERE

CHLORINE

PAPER
TRADE JOURNAL
Title Reg. U. S. Pat. Off.
W. L. Cook, Editor

PAPER AND PULP OUTPUT GAINS

Production of paper and paperboard by domestic mills in October reached the highest tonnage since January, 1943, and was 163,285 tons above September, 1945. Output of wood pulp also increased 70,919 tons above September, while the total receipts of pulpwood decreased 808,622 cords under September. These latest figures just released by the Bureau of the Census, indicate that the paper industry is making excellent progress in increasing production and now that the price of newsprint has been increased from $61 a ton to $67 a ton, and all controls will be removed at the first of the year, this segment of the industry will begin 1946 in a very favorable position.

Production data for October, shows that all major types of paper increased in October above September 3%. Book paper output increased 27,394 tons, newsprint, 6,701 tons; groundwood papers, 5,928 tons; fine paper, 9,618 tons, and wrapping paper, 20,347 tons. The total output in October of paper was 784,207 tons, compared with 690,643 tons in September and with 715,596 tons in Ocotber, 1944. Total production of paperboard in October was 788,485 tons, compared with 718,827 tons in September, and with 785,579 tons in October, 1944. Folding boxboard increased 5%; set-up boxboard, 6%; building board, 6%, and miscellaneous boards, 11%.

Wood pulp production in October, according to the Bureau of the Census data, totaled 875,393 tons, compared with 804,474 tons in September; consumption was 999,421 tons, compared with 885,885 tons in September. Inventories at pulp mills totaled 45,946 tons in October, compared with 52,492 tons in September, and at paper and paperboard mills, 390,130 tons in October, compared with 318,099 tons in September. The proportions of estimate are as follows: total wood pulp production, 8; consumption, 7; inventories, 4; total sulphite production, 9; consumption, 4; inventories, 4; total sulphate production, 9; consumption, 9; inventories, 4; soda pulp production, 19; consumption, 18; semi-chemical pulp production, 30; consumption, 28; defibrated, exploded pulp, etc. production, 14; consumption 14. These data are estimated to give 100% coverage of the industry.

Pulpwood receipts totaled 1,493,985 cords in October, compared with 1,685,363 cords in September; consumption was 1,451,748 cords, compared with 1,389,770 cords in September, and inventories aggregated 2,963,788, compared with 2,886,899 cords in September. Of the total October receipts, 1,325,313 cords were of domestic origin, and 168,672 tons were imported. Of this total softwood amounted to 1,296,444 cords, and hardwood, 197,541 cords. Consumption of softwood for October totaled 1,275,828 cords, compared with 1,195,467 cords in September. Inventories of softwood totaled 2,415,091 cords in October, compared with 2,279,460 cords in September. Consumption of hardwood totaled 175,915 cords in October, compared with 194,303 cords in September. Inventories of hardwood were 547,697 in October, compared with 607,439 cords in September.

Waste paper receipts at the mills aggregated 728,807 tons in October, compared with 673,041 tons in September; consumption was 722,287 tons in October, compared with 646,021 tons in September, and inventories were 704,109 in October, compared with 691,747 tons in September. Mill receipts of rags totaled 35,987 tons in October, compared with 30,232 tons in September; consumption was 38,410 tons in October, compared with 34,391 in September, and inventories were 53,567 tons in October, compared with 54,936 tons in September. Receipts of straw fiber in October totaled 57,203 tons, compared with 89,309 tons in September; consumption in October was 50,123 tons, compared with 39,195 tons in September, and inventories were 189,828 tons in October, compared with 171,583 tons in September.

Mill receipts of staple and linter cotton totaled 4,088 tons in October; consumption was 3,439 tons, and inventories were 6,279 tons; data not shown separately for September. Receipts of Manila fiber totaled 579 tons in October, compared with 574 tons in September; consumption was 868 tons in October, compared with 526 tons in September, and inventories were 2,379 tons in October, compared with 2,275 tons in September. Receipts of all other fibers for October totaled 15,868 tons, compared with 18,414 tons in September; consumption was 29,072 tons in October, compared with 27,902 tons in September, and inventories were 75,182 tons in October, compared with 101,827 tons in September.

DATA ON WOOD PULP GRADES

Wood pulp consumption of domestic origin in October totaled 999,421 tons, of which 747,741 tons was of own manufacture, and 113,662 tons purchased; inventories totaled 39,621 tons of own manufacture, and 131,651 tons of purchased pulp. Of this total, 253,415 tons were sulphite, of which the bleached paper grades represented 127,439 tons, and the unbleached grades, 117,886 tons. Consumption of sulphate pulp for October aggregated 434,008 tons of domestic origin, of which 346,939 was unbleached; 72,868 tons bleached, and 14,204 tons semi-bleached. Inventories of domestic origin at the end of October were 4,586 tons of own manufacture, and 25,334 tons of purchased pulp. Inventories of bleached sulphate at the end of October totaled 9,137 tons of domestic origin of own manufacture, and 12,167 tons of purchased pulp. Consumption of soda pulp totaled 42,989 tons in October, of which 30,398 tons were of own manufacture, and

30,398 tons purchased pulp; inventories of domestic origin were 5,256 tons in October of own manufacture, and 5,462 tons of purchased pulp. Consumption of groundwood pulp totaled 171,683 tons in October, of which 144,884 tons were of domestic origin of own manufacture, and 5,545 tons of purchased pulp. Inventories at the end of October totaled 8,024 tons of domestic origin of own manufacture, and 5,462 tons of purchased pulp.

Canadian International Calls Bonds

NEW YORK, N. Y., December 21, 1945—Canadian International Paper Company announced that it has borrowed $15,500,000 U.S. funds from The Chase National Bank, Bankers Trust Company and The First National Bank of Boston, on 1½% notes maturing July 1, 1949. The loan is secured by pledge of short term Canadian governments to 110% of tis face value. As a safeguard for the banks in case future governmental restrictions should prevent repayment of the loan in U.S. funds, the principal of the notes has been guaranteed by International Paper Company.

Proceeds of the loan will be applied to payment of the Canadian International Paper Company First Mortgage Bonds, 6% Series due 1949, which have been called for redemption January 1, 1946 at 101½ and accrued interest. The bonds, of which $15,286,000 are outstanding, are payable in United States funds on presentation to the Chase National Bank in New York or the State Street Trust Company in Boston. Bondholders also have the option of receiving payment in Canadian funds, by presenting their bonds to the Bank of Montreal in either Montreal or Toronto.

Nivison on Maine Industrial Board

AUGUSTA, Me., December 22, 1945—Robert Nivison, general manager of the Hollingsworth and Whitney Company in Waterville, has been elected to the Board of Directors of the Associated Industries of Maine at the annual meeting of the organization here.

Production Ratio Report*

(Production as per cent of six-day capacity)

COMPARATIVE WEEKLY SUMMARIES

Current Weeks—1945		Corresponding Weeks—1944	
November 10	97.0	November 11	91.3
November 17	96.4	November 18	90.3
November 24	91.4	November 25	87.2
December 1	97.5	December 2	91.0
December 8	99.0	December 9	93.7
December 15	99.0	December 16	89.3

COMPARATIVE MONTHLY SUMMARIES

Year	Ja.	Fe.	Ma.	Ap.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Year Av.
1944	88.7	88.5	88.1	87.6	88.7	89.8	80.3	90.6	88.2	92.5	90.6	92.4	88.1
1945	86.7	89.4	90.2	88.1	89.8	91.2	80.8	88.6	90.2	95.9	95.5		

COMPARATIVE YEARLY SUMMARIES

	1938	1939	1940	1941	1942	1943	1944	1945
Year to Date	71.7	83.5	86.1	97.3	90.7	88.1	88.6	89.9
Year Average	71.5	83.4	85.6	97.4	90.4	87.8	88.1	

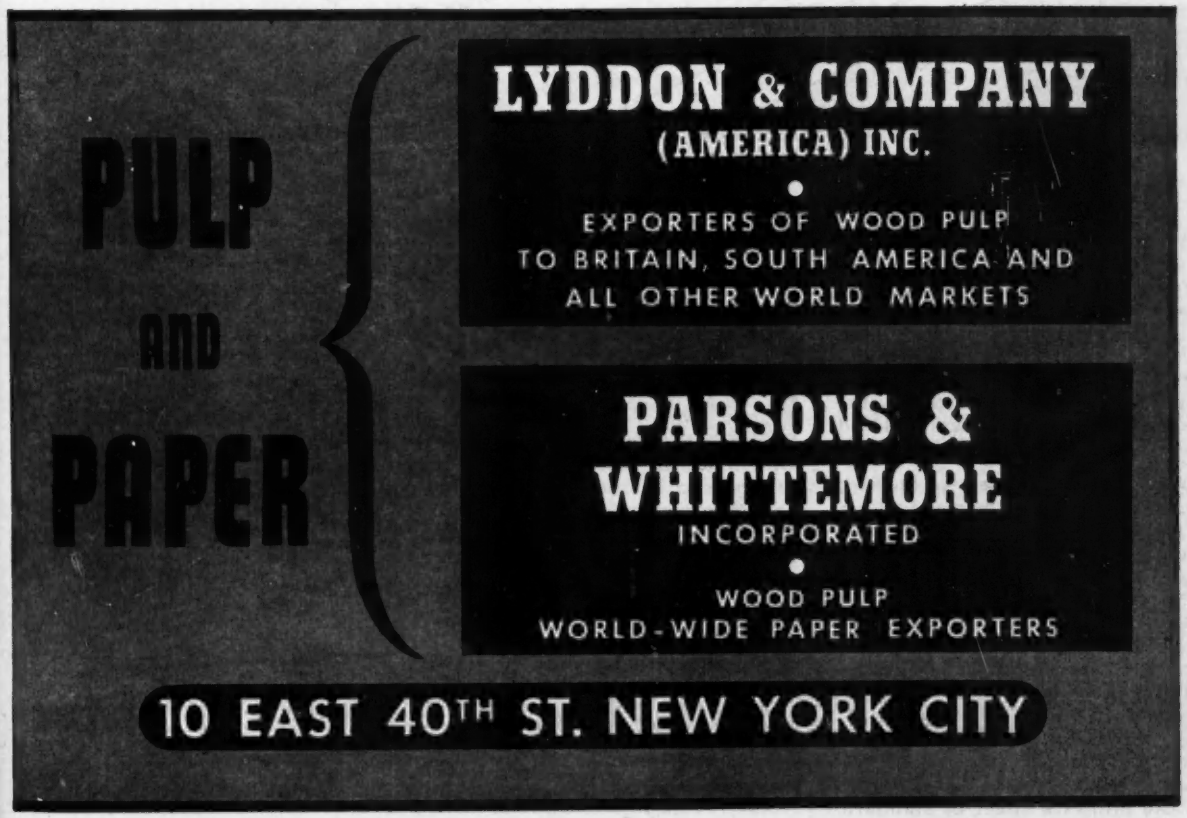
* Based on tonnage reported to American Paper and Pulp Association. Does not include mills reporting to National Paperboard Association, except in isolated cases where both paper and paperboard are produced and separate tonnage figures are not readily available. Does not include mills producing newsprint exclusively.

PAPERBOARD OPERATING RATIOS †

Current Weeks—1945		Corresponding Weeks—1944	
November 10	97	November 11	96
November 17	95	November 18	96
November 24	91	November 25	91
December 1	96	December 2	94
December 8	97	December 9	95
December 15	98	December 16	94

Year	Ja.	Fe.	Ma.	Ap.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Year Av.
1944	90	96	95	96	96	96	85	96	92	95	95	85	93
1945	91	95	97	97	96	96	86	90	91	97	95		

† Per cents of operation based on "Inch-Hours" reported to the National Paperboard Assn.



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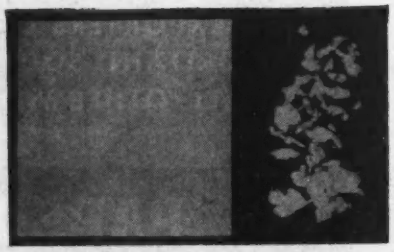

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122 E. 42nd St., New York 17, N. Y.
Edited by R. G. Macdonald, Secretary

Studies of Dielectric Properties of Chemicals Pulps*

I. Methods and Effects of Pulp Purity

By Cyril Delevanti, Jr.[1] and Paul B. Hansen[2]

Abstract

A description is given of the apparatus and techniques developed for the measurement of such dielectric properties of pulp as power factor and dielectric constant (specific inductive capacity). By means of a special test chamber and capacitor, uncontaminated laboratory test sheets were subjected to extreme desiccation and their dielectric properties were evaluated under this condition. Although a high degree of desiccation was achieved through flushing and pumping to a good vacuum, evidence was found for a fairly strong influence of residual moisture content. Within the limits of experimental error, the Clausius-Mosotti relationship was found to hold for paper and a means is thus afforded for correcting data on power factor, dielectric constant, and loss factor to a standard density of test sheet; a correction was made also for air-gap between the test sheet and the electrodes of the capacitor. The influences of washing, acid extraction, salt content, and lignin content of unbleached kraft pulp were explored. Qualitative observations were made on Brauns's native lignin. Metallic ions are shown to be responsible for a substantial portion of the loss factor of paper, especially at frequencies well above power frequencies, and it is probable that lignin contributes disproportionately to the loss factor of lignin-containing pulp.

Introduction

The manufacturers and users of electrical equipment are dependent on paper for insulation to a greater extent than is generally realized. Oil- or wax-impregnated papers find extensive use in power transmission cables and as the dielectric in wound capacitors. In these applications paper is exposed to the most severe service conditions met in electrical use. Coil-winding paper, electrolytic capacitor paper, and saturating papers are also extensively used.

Paper possesses a unique combination of properties which accounts for its wide use and makes it extremely difficult to replace. The dielectric constant of paper can easily be varied between 2.5 and slightly over 1. Because of the large percentage of air voids in paper, its dielectric constant is lower than that of pure cellulose, which is high for a solid dielectric (about 7). The power factor of dry paper is a small fraction of 1% and its resistivity may reach values as high as 10^{18} ohm-cm. Its dielectric strength in thin films is very high. Coupled with these interesting properties are the valuable mechanical attributes of strength and flexibility, and good chemical stability. Not the least of its advantages are its relative cheapness and large production.

However, paper is by no means a perfect dielectric. Problems arise relating to stability under severe service conditions. Its power factor, while fairly low, is not as good under the actual conditions of use as certain other materials such as mica, amber, ceramics, etc. Combination paper-oil dielectrics behave like series rather than parallel circuits. Consequently, any gain in capacitance obtainable by increasing the specific inductive capacity of the impregnant is limited by that of the paper sheet.

The existence of these defects of paper give point to any research which will add to the general knowledge of its behavior in electrical applications. The war added further significance to such research. Modern warfare requires prodigious quantities of all types of electrical apparatus and imposes extremely severe service conditions. Indeed, military conditions considered normal may be far harsher than those fomerly considered too severe for even accelerated test purposes.

There is growing evidence that the problems arising should be divided into two classes, those relating to direct current service and those to alternating current. The ultimate criterion of quality is the life of the unit in the service for which it was designed. d.c. life is a function of electrochemical and thermal degradation and points of low resistivity in the paper. a.c. life, on the other hand, is affected principally by the magnitude of the dielectric loss occurring, which results in heating and thermal degradation. Dielectric losses are undesirable also on account of the attenuation and distortion of signals they bring about in telegraphy and telephony.

One of the matters which has not been fully investigated is the influence of the chemical constituents and physical properties (principally density) of dry paper on specific inductive capacity and power factor. It is with this subject that the present investigation is concerned.

* A portion of dissertations submitted in partial fulfillment of the requirements of The Institute of Paper Chemistry for the degree of Doctor of Philosophy from Lawrence College, Appleton, Wis., 1943. This work was carried out under the direction of J. A. Van den Akker.

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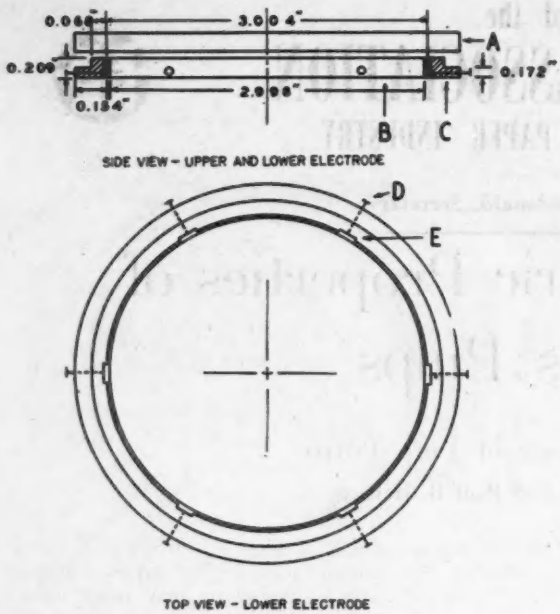

FIG. 1

Review of Previous Work

It will not be attempted to cover comprehensively the extensive literature relating to the electrical behavior of cellulose, but to establish a background for this study and acquaint the reader in a general way with the research which has been conducted in this field. For more extensive surveys, the reader is referred to the excellent article by Kohman *(1)*, and the comprehensive reviews prepared annually by the Committee on Chemistry, Conference on Electrical Insulation of the National Research Council.

The General Behavior of Cellulose as a Dielectric

The presence of water in cellulosic material exerts a profound effect on its specific inductive capacity and power factor. These effects have been studied extensively and are reported in the work of Argue and Maass *(2)*, Whitehead and Greenfield *(8, 27, 28)*, Race, Hemphill, and Endicott *(22)*, and Garton *(7)*. In general, increase of moisture content is accompanied by increases in these electrical properties, the power factor being very strongly affected.

Uncertainty still exists about the possibility of removing all the water from paper. Garton *(7)* claimed that paper can be brought to complete dryness at a temperature as low as 60° C. by circulation of dry air, and that reductions in pressure merely accelerate the process but do not influence the final properties. Greenfield *(8)*, on the other hand, gave curves showing different equilibrium values of electrical properties for different drying pressures. Murphy and McLean *(18)* analyzed the gases evolved from paper during drying and concluded that part of the water came from decomposition. A consequence of this conclusion is that the evolution of water would proceed as long as the material was heated. The authors suggest that the dry state be arbitrarily assumed to be that at which the evolved gases are of constant composition.

Vogel *(25)*, Piper, Kerstein, and Fleiger *(21)*, and Finch *(6)* have shown that the presence of electrolytic materials influences the insulation value of paper, usually adversely. The presence of chloride ions is especially deleterious, particularly in direct current service.

McLean *(12)* discovered that only by treatment of pulp with dilute acid could most of the cationic material be removed; extraction with distilled water was not effective below a very appreciable ash content. The acid-neutralizing ability of cation-containing paper was demonstrated, and the theory advanced that most of the cationic material is held in chemical combination with organic acidic groups present in the pulp. Exchange reactions were shown to be involved in the introduction or removal of cations from paper. Evidence that this adsorption takes place on uronic acid groups was presented. McLean, Egerton, Kohman, and Brotherton *(14)* suggested that the superior ability of unbleached kraft paper, as compared with bleached paper, to absorb cations is partially responsible for their longer life in d.c. units impregnated with chlorinated organic materials (cf. *13*).

The behavior of cellulose in alternating fields strongly suggests that the polar hydroxyl groups are partially responsible for the effects observed. Stoops *(24)*, Hill *(9)*, and Campbell *(4)* point this out in work on regenerated cellulose and cellulose derivatives.

Theories on the Dielectric Behavior of Heterogeneous Materials

It is an established fact that the behavior of cellulose in alternating fields can be attributed to reversible absorption, and that losses resulting from true conductivity account for less than 1% of the total loss in well-dried paper. The causes of reversible absorption in structurally heterogeneous material are, however, still obscure.

Manning and Bell *(15)* have given an excellent review of the mathematical analysis of dielectric behavior, and showed that, when an alternating field is applied to a dielectric exhibiting reversible absorption, loss of energy is a natural consequence. Their basic theoretical equations, however, take into account only one relaxation time and do not agree with the experimentally determined data for most substances, notably paper. von Schweidler *(23)* and Wagner *(26)* have proposed empirical methods by which observed data can be fitted to the theoretical expressions. These methods have been reviewed by Yager *(29)*.

Polarization in a dielectric is considered to be the cause of all absorption phenomena. Murphy and

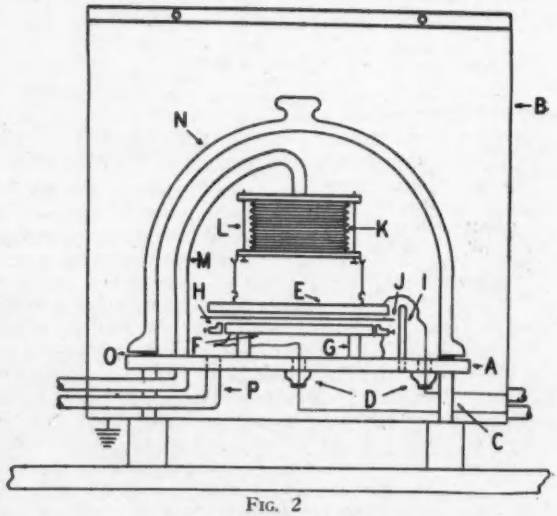

FIG. 2
Test Shield and Chamber

Morgan *(19)* have given a thorough survey of the various types of polarization which they list as electronic, atomic, Debye orientational (dipole) polarization, and interfacial polarizations. The last two are of greatest significance at all frequencies up to the infrared region of the spectrum.

Morgan and Yager *(16)* have discussed the effects of polarity, dipole moment, viscosity, molecular structure, and temperature on the specific inductive capacity and loss factor of various organic liquids and some of the synthetic polymers. It is suggested that, for substances having very large molecules, elastic movement of polar substituent groups in alternating fields may be responsible for some of the phenomena observed.

Murphy and Lowry *(17)* have considered in detail, with particular reference to cellulose, the interfacial polarizations mentioned in the preceding paragraphs. They postulate an "interstitial conduction system" which follows some feature of the submicroscopic structural pattern of the material. Using their assumptions, they were able to explain the form of the current-time curve, the Hopkinson-Curie principle of superposition (which states that the current in a dielectric at any instant is related to previous changes in impressed field strength and polarity), and the power losses observed. It is noteworthy that, by the use of the equivalent circuits they propose, they were enabled to obtain expressions for specific inductive capacity and loss factor similar in form to those derived by other investigators for homogeneous materials.

Apparatus

The main features of the apparatus employed to measure the dielectric constant and loss angle of specimens under various conditions of temperature and desiccation include (1) a test capacitor with a guard ring contained in a chamber capable of evacuation to low pressures, (2) an electrode arrangement whereby the electrodes can be separated or brought together *in vacuo* to permit drying of the paper specimen, and (3) a suitable electrical bridge with auxiliary apparatus for measuring the dielectric constant and loss angle of the test capacitor.

The capacitance and loss angle of the test capacitor were determined with a conjugate Schering bridge *(1)*. The shielding was comprised of copper boxes and copper pipes, and the insulation used in this shielding and in the condensers was polystyrene or other material of very low loss. The capacitance of the test capacitor was obtained with accuracy by means of a precision variable air condenser. Capacitors as large as 100 $\mu\mu f$. were chosen for use in the Wagner ground to compensate for any stray capacitances in addition to the added capacitance of the guard ring to the upper test electrode when the test capacitor is in the circuit. All resistances were matched 10,000-ohm wire-wound, noninductive units having minimum distributed capacity.

The bridge was energized through an isolation transformer which was especially shielded to have small capacitance between the coils. In the earlier phases of this work the source of electromotive force was a 1000-cycle oscillator. In order that a wide range of frequencies might be employed, a transitron oscillator was constructed in a later phase of the work. This oscillator was built from information published by Delaup *(5)* and Jordan *(10)*. It delivered stable and fairly pure sinusoidal alternating voltages of frequencies ranging from 200 to 10,000 cycles per second. The voltages delivered to the bridge terminals

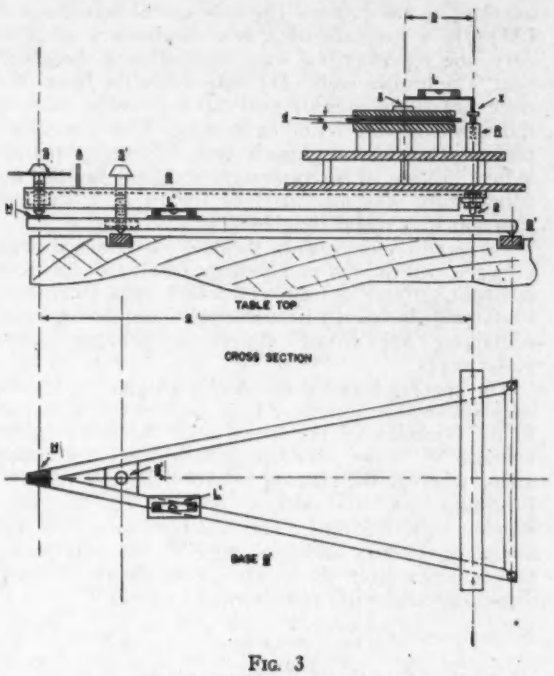

FIG. 3
Diagram of Plate Separation Gage

ranged from 15 volts at 200 cycles per second to 6.75 volts at 10,000 cycles per second.

Low-voltage, 60-cycle signals were supplied from the lighting circuit to the isolation transformer through a variable autotransformer.

The bridge balance detector was a three-stage resistance coupled amplifier equipped with a sensitive rectifier-type output meter. The whole unit, including the A, B, and C batteries and output meter, was carefully shielded by enclosure in a copper box (the meter was read through a screened opening in the top of the box).

Drawings of the test capacitor are shown in Fig. 1. It consists of an upper electrode (A), a lower electrode (B), and guard ring (C). The small slots (E) were for the insertion of mica spacers between the inner electrode and the screws (D), which rigidly hold the guard ring to the inner electrode and maintain a coplanar condition between the guard ring and electrode surfaces. The guard ring was cut away at the top surface, as shown, to narrow the effective radial width. This was done to decrease the capacitance of the guard ring to the upper electrode, for smaller guard ring capacitance requires smaller capacitors in the Wagner ground connection. The surfaces of the electrodes were lightly plated with platinum to minimize effects caused by thin films formed by corrosion.

The shielded test chamber is shown in Fig. 2. The evacuated vessel, comprised of a heavy base plate (A), and a bell jar (N), was heated in earlier work by playing infrared lamps upon the blackened outer copper box (B). The elevated temperature, together with reduced pressures of the order of 1 micron, permitted the specimens to become rather thoroughly desiccated. In order that moisture leaving the specimen could have free access to the evacuated space, the upper electrode was suspended from a metal bellows (K). When evacuated, the bellows assumed its normal configuration and held the top electrode a few millimeters above the specimen; when air was

admitted to the bellows (by way of the tube-support (M)) to a pressure of a few centimeters of mercury, the top electrode was lowered onto the specimen. The lead-in seals (D) soldered to the base plate were sawed-off ends of grid-cap type metal vacuum tubes, which were found satisfactory from the standpoint of vacuum tightness and dielectric quality. When heating was done with external lamps, the temperature was measured by means of a thermojunction in a metal thimble (I).

In certain experiments the cell was flushed with nitrogen, which was prepared by passing commercial nitrogen through a train comprised of a large tube containing electrically heated copper, and drying tubes containing anhydrone, phosphorus pentoxide, and glass wool.

The spacing between the electrodes must be known with reasonable accuracy. It is not, of course, equal to the thickness of the sheet, since the latter is the average of many measurements made over small areas, whereas the spacing between the electrodes is determined by the thickest portions of the sheet (under light loading). The absolute values of the dielectric constant and loss angle of the sheet must be computed from the measured values for the test capacitor, employing equations (1) and (2).

$$K' = 1/[1-d/t + 1.11\ A/4\pi tC_p] \text{ and} \qquad (1)$$

$$\delta' = \delta[1 + K'\ (d-t)/t], \qquad (2)$$

in which K' is the dielectric constant of the sheet (corrected for air gap), d is the spacing between the electrodes at the center, t is the thickness of the sheet (both d and t are in cm.), A is the area of the lower guarded electrode in sq. cm. (inclusive of half the area of the circular gap between that electrode and the guard ring), C_p is the measured capacitance in micro-microfarads, δ is the observed loss angle of the test capacitor, and δ' is the loss angle of the sheet (corrected for air gap).

It can be seen by inspection of equations (1) and (2) that errors in the measurement of t and d would result in considerable error in the calculated values of K' and δ'. An apparatus developed for measurement of the electrode separation is shown in Fig. 3. The screw S and spirit level L enable one to maintain the point x at a constant elevation relative to point y. A *change* in the spacing d can be measured by rotating S to restore the spirit level to its normal position and multiplying the change in the reading of the dial attached to S by a constant (which includes the lengths a and b, and the pitch of the screw). The base B' is brought to a standard position by means of screw S' and spirit level L'.

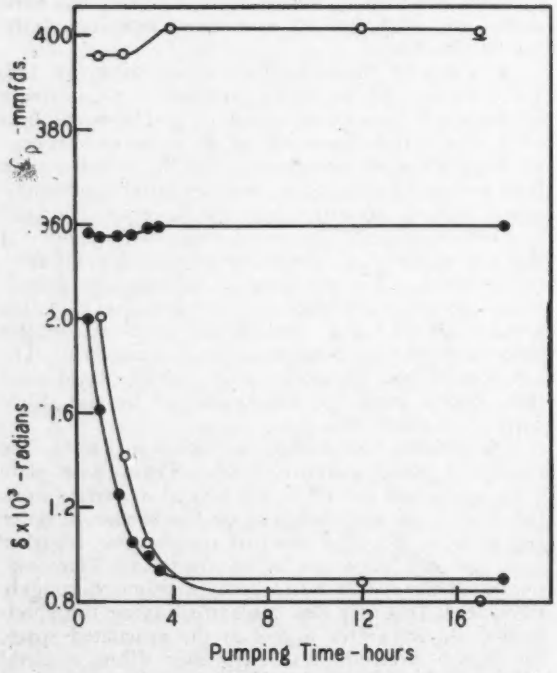

FIG. 4

δ and Cp at 1000 Cycles Sec. $^{-1}$ and 70° F. vs. Pumping Time with and without Flushing 50 p.s.i. pressing—Sheet method I
○ With flushing • Without flushing

Immediately following the making of electrical measurements on a specimen, and just prior to the breaking of the vacuum and removal of the sheet, the system is leveled. Then the specimen is removed, and three small mica spacers of the same order of thickness as the specimen are inserted between the plates at the guard ring. Under reduced pressure and at about the same temperature that obtained with the specimen in place, the capacitance of the air condenser thus formed is measured. The spacing is calculated from the formula $d=1.11A\times 4\pi C$. The screw S is then rotated to restore the spirit level L to its normal position, and the change in spacing corresponding to the change in dial reading is added to or subtracted from the separation given by the mica spacers. The result is the electrode spacing maintained by the specimen. The sensitivity of the device is of the order of 0.00004 inch, which means that the error in separation caused by uncertainty in setting is of the order of 0.4% when the separation is at the fairly typical value of 0.01 inch.

The spirit level would not withstand elevated temperatures; therefore, external heating of the whole chamber was not employed after the means of measurement of plate separation had been devised. Instead, only the lower electrode was heated by means of a small electric heater placed under it. The temperature of the electrode was measured by a short household oven thermometer inserted into a brass block soldered to its under side, and a relationship was established between the temperature indicated by the thermometer and the temperature of a sheet lying between the electrodes.

Measurements of sheet thickness t were made with a deadweight dial micrometer at reduced anvil pressure, in view of the light loading imposed on the specimens by the upper electrode. The mean of ten measurements on each sheet was regarded as its true thickness.

Preliminary Investigation

Prior to an investigation of pulping variables, it was desired to obtain data on certain technical factors, for which purpose a commercial unbleached kraft pulp, specially washed for the manufacture of condenser tissue, was employed. Two methods were employed for the preparation of test sheets from the commercial pulp.

Test Sheet Preparation

Method I. The unbleached kraft pulp was refined for 40 minutes in the Lampén mill to a freeness of 750 ml. S.R. Sheets were formed on the British sheet mold 1.4 grams in weight instead of the customary 1.2 grams and couched from the wire on a filter paper. A second filter paper backed by a chromium-plated disk was laid over the sheet and the combination pressed between blotters at 10 lb./sq. in. for 5 minutes. Other sheets were given a second

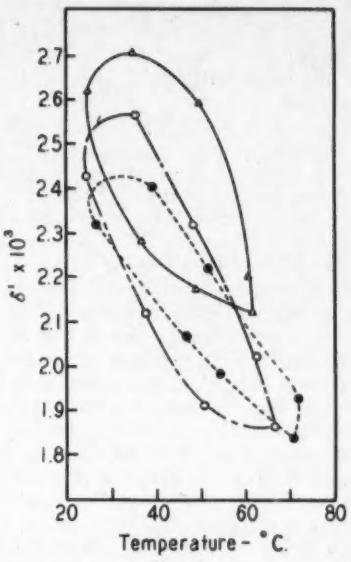

FIG. 5

Hysteresis Loss Angle—Temperature Loops at 100 Cycles Sec. $^{-1}$ (50 p.s.i. pressing—Sheet method II. Two hours between points)
Δ Water seal ○ Atmosphereic seal • Desiccated air

pressing at 10, 50, 350, or 5000 lb./sq. in. for 5 minutes with a change of blotters. The two highest pressures were obtained with an Elmes press. The finished sheets, together with the filter papers, were air dried and stored on the rings over anhydrone in a desiccator until ready for use. Sheets fromed by Method I have a matt finish.

Method II. The unbleached kraft pulp was refined for 40 minutes in the Lampén mill as in Method I. Sheets were formed on the British sheet mold 1 gram in weight. The formed sheets were couched on a blotter, a chromium-plated disk laid over the sheet, and the combination pressed at 10 lb./sq. in. for 2 minutes. After pressing, the blotter was carefully removed and the first sheet on the disk registered with a second sheet on a blotter prepared in the same way; the two were laminated at 10 lb./sq. in. for 2 minutes, forming a two-ply sheet. The procedure was repeated to form a three-ply sheet. The three-ply sheet on the disk was given an additional pressing against a dry blotter at 10 lb./sq. in. for 2 minutes to remove as much water as possible. The blotter paper was removed and the sheet was given the final smoothing press against a sheet of moistureproof cellophane, which was backed by the chromium-plated disk. Other sheets were given a second pressing at 10, 50, 350, or 5000 lb./sq. in., holding the pressure for 5-minute intervals. As in Method I, sheets were air dried on the British rings and stored on the rings over anhydrone in a desiccator until ready for use. Sheets formed by Method II have a smooth finish and a high density.

Before using a test sheet, it was visually inspected by transmitted light for imperfections which would give rise to an unnecessarily high electrode spacing. Any such irregularities were carefully removed by means of a sharp razor blade.

Flushing as an Aid to Drying

It is well established that the moisture content has a profound effect on the loss angle of cellulosic materials and, at higher moisture contents (in the ordinary range), the dielectric constant is also strongly affected. Extreme drying is probably more important in a study of dielectric loss than in any other type of investigation on paper. In order that the moisture content may be reduced to a very low degree, it is necessary to heat the specimen and reduce the partial pressure of water vapor surrounding the specimen. Simple evacuation of the gases in the test chamber is the method ordinarily employed to reduce the pressure of water vapor. If the pump will sustain a pressure of 1 micron (0.001 mm. of Hg) and if the chamber and all connections are perfectly vacuum tight, then as pumping proceeds the total pressure of 1 micron in the chamber will eventually be due to water vapor. Although the pressure of the water vapor will be low enough to result in good drying as judged by ordinary standards, it will still be unnecessarily high. If the water vapor in the chamber is flushed out of the chamber by filling it with dry nitrogen to a pressure of several centimeters of mercury, the partial pressure of the water vapor on evacuation will be exceedingly low, being a small fraction of 1 micron (the fraction will be approximately the ratio of the partial pressure of moisture in the dry nitrogen to the total pressure). As more moisture is given off by the specimen, the partial pressure will rise and flushing may again be necessary.

The results of experimental runs carried out to test the effect of flushing are given in Fig. 4. The uncorrected loss angle (substantially smaller than the corrected value) and the observed capacitance are plotted against the pumping time. (The dielectric constants of the two specimens employed were not necessarily different—the greater capacitance obtained with one of the specimens was due to the smaller thickness of that specimen.) Flushing was performed with oxygen-free, dry nitrogen every half hour during the first 4 hours. It will be seen that the influence of flushing is not great, the chief effect being to accelerate somewhat the rate of equilibrium. The test sheets were made by Method I, using a pressure of 50 lb. per sq. in.

The results obtained in the study of the influence of flushing indicated strongly that minute, accidental leaks in the apparatus caused a continuous flushing with atmospheric air. If the leaks and pumping rate are such that the pressure in the chamber is 1 micron, the partial pressure of the water vapor in the chamber would eventually approach about 0.02 micron, the exact value depending upon the dryness of the atmosphere surrounding the test chamber and connections. The beneficial effect of a slight leak appears to be generally recognized.

Many independent runs have indicated the slight rise in capacitance of a desiccated sample during the earlier stages of pumping. It is possible that this rise is the result of a slight contraction in the thickness of the test specimen caused by the removal of moisture. At least in the range of higher moisture contents, however, the high dielectric constant of water (about 80 for free water at lower frequencies) causes the observed dielectric constant of paper to be reduced when the moisture content is decreased. On the other hand, Argue and Maass *(2)* have shown that the dielectric constant of the most energetically bound water is very much less than that of free water, so that it is conceivable that reduction in spacing could overshadow the decrease in the contribution of the water to the over-all dielectric constant.

Loss Angle-Temperature Hysteresis

An unexpected dependence of loss angle on temperature was found. On reducing the temperature, it

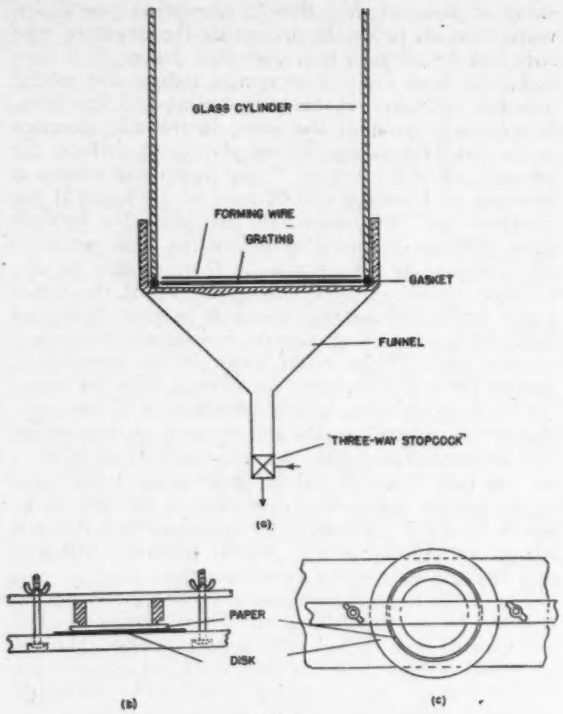

FIG. 6
Sheet Mold and Drying Apparatus

was observed that the loss angle increased [according to Race, Hemphill, and Endicott *(22)*, reduced temperature causes a decrease in certain pulps and an increase in others] but that it did not decrease along the same path when the temperature was increased again. Typical results are shown graphically by the curve drawn through the open circles in Fig. 5. The "hysteresis" was displayed in spite of the establishment of equilibrium at each new point, and maintenance of pumping to a good vacuum (1 to 2 microns) throughout the runs.

On the assumption that a substantial fraction of the observed loss is due to residual moisture, experiments were designed to vary the rate of entry of water vapor through leaks into the chamber. In one case the copper shield surrounding the test chamber was filled with desiccated air. There was no provision to block moisture diffusing into the chamber from tubing and tube connections outside the copper shield. The loop obtained, shown by the solid dots in Fig. 5, was not greatly different from that observed when atmospheric air surrounded the test chamber; it tended to be lower. In a third run (the same specimen, made by Method II at 50 lb./sq. in., was employed in the three runs), a water moat was formed around the bell-jar gasket. Water vapor would then enter through any small leaks in the gasket, and the presence of water in the moat would increase somewhat the partial pressure of water vapor in the air surrounding the chamber. The loop observed in this case was strikingly higher than obtained in the first two runs, definitely establishing the importance of water vapor at low partial pressure.

The existence of the loops may be attributed to water vapor in view of the greater affinity of cellulose for water at lower temperatures. Even at constant relative humidity, cellulose adsorbs more water at lower temperatures than at higher temperatures and, in the present case, it appears certain that the relative humidity in the chamber would be higher at lower temperatures. The hysteresis loops shown in Fig. 5 are therefore attributed directly to the well known hysteresis phenomena displayed by the moisture content-relative humidity-temperature relationships for cellulose.

The partial pressure of water vapor in air dried with phosphorus pentoxide is lower than 2×10^{-8} mm. of mercury, as calculated from data given in International Critical Tables *(20)*. This pressure is of the order of that obtained by pumping to a total pressure of about 1 micron, and permitting natural flushing caused by a minute leak to occur. Evidently the methods of drying cellulose by evacuation to 1 micron, or by drying with air or nitrogen passed through phosphorus pentoxide, are not sufficiently rigorous to yield a loss angle which is characteristic of the cellulosic material itself. In a study of the magnetic susceptibility of gases, Bitter *(3)* found that phosphorus pentoxide was not sufficiently effective in removing traces of water vapor. A liquid air trap was found to be more effective. Undoubtedly, observations on specimens dried at elevated temperatures, with removal of moisture by a trap immersed in liquid air, would yield results more nearly characteristic of the material under study.

Study of Experimental Pulps

Three kraft pulps were prepared in a laboratory digester for the second part of this study. The characteristics of these pulps are listed in Table I.

TABLE I.—UNBLEACHED PULPS USED IN INVESTIGATION

Pulp	Permanganate No.	Lignin, %	Pentosans, %
I	28.8	6.8	8.5
II	26.4	6.0*	8.3
III	17.5	2.3	7.6

* Estimated.

In addition to these pulps, a kraft pulp which had been prepared in the laboratory to a degree of cooking about the same as that of Pulp III and given a one-stage hypochlorite bleach was obtained for study. This pulp is designated as Pulp IV.

In order that the requisite number of sheets could be prepared with the economical use of distilled water, a small sheet mold was constructed from a glass cylinder and a Büchner funnel. This arrangement, shown in Fig. 6 (a), had the further advantage of minimizing the contact of the pulp suspensions with metal; Fig. 6 (b) and (c) show the arrangement for drying the sheets under tension against polished chromium-plated disks. The sheet-making procedure was essentially as follows: After the pulps had been given the necessary treatment, portions which would give the desired sheet weight were disintegrated in distilled water. The mold was partially filled with water, the pulp slurry poured in, and stirred with a glass stirrer. When the mold had been drained, the glass cylinder was removed and the wire cloth and wet sheet were lifted out. The sheet was transferred to a clean blotter and, after having been rolled with a heavy brass roller between two changes of blotters, was finally transferred to a chromium-plated disk. The disk and sheet were pressed between blotters for 5-minute intervals at an indicated pressure of 25 lb./sq. in. in a hydraulic press. To obtain variations in sheet density, specimens were given a second pressing between fresh blotters at pressures ranging from 10 to several hundred lb./sq. in. before the final drying.

The dry sheets were trimmed just inside the marks left by the rings—this left them slightly larger in

diameter than the electrodes—and small tabs were left to facilitate handling. To reduce the irregularity of the sides of the sheets away from the disks, those surfaces were sanded lightly with very fine sandpaper wrapped around a flat wooden block. It was standard practice to make five or six sheets of each sample and select the best four, by visual inspection, for the electrical tests. The selected specimens were stored in a desiccator prior to conditioning and testing.

Relation Between Sheet Density and Electrical Properties

A series of sheets were prepared with a wide range of densities from an acid-washed pulp. Densities were calculated from the moisture-free weight of the sheets and the measured values of thickness and area. The data for this series are presented in Table II and are shown graphically in Figs. 7 and 8. In this and all following work the sheet temperature was about 82° C. and equilibrium was established at a pressure of about 1 micron.

TABLE II.—EFFECT OF DENSITY ON CORRECTED DIELECTRIC CONSTANT (K'), LOSS ANGLE (δ'), AND LOSS FACTOR ($K'\delta'$) AT 60 CYCLES PER SECOND

Density, g./cc.	K'	$\delta' \times 10^5$ radians	$K'\delta' \times 10^5$ radians
0.242	1.28	1.10	1.41
0.547	1.75	1.69	2.96
0.771	2.45	2.03	4.99
0.848	2.51	2.50	6.28
0.936	3.03	2.28	6.91

When the quantity $(K'-1)/(K'+2)$ is plotted against the sheet density, the points establish a straight line which passes through the origin (Fig. 7). In no case does the deviation of a point from the line exceed the experimental error (taken as three times the standard error), the magnitude of which is indicated by the vertical segments. Paper is thus shown to follow the Clausius-Mosotti relationship, which postulates direct proportionality between $(K'-1)/(K'+2)$ and density. It should be pointed out that the Clausius-Mosotti equation was originally developed with reference only to homogeneous materials comprised of simple molecules.

It can be shown that the corrected loss factor should also be directly proportional to the sheet density. The data plotted in Fig. 8 show this to be approximately true, although there is a suggestion of nonlinearity in the experimental relationship.

In the experiments which follow, all values of K' were corrected to a standard density of 0.8 gram per cc. by the use of the Clausius-Mosotti equation. Then, assuming direct proportionality between loss factor and density, the values of loss factor were corrected to this density. The corrected values of loss angle were then calculated. These values of dielectric constant and loss angle, corrected for both air-gap and density, are denoted by K'' and δ'', respectively.

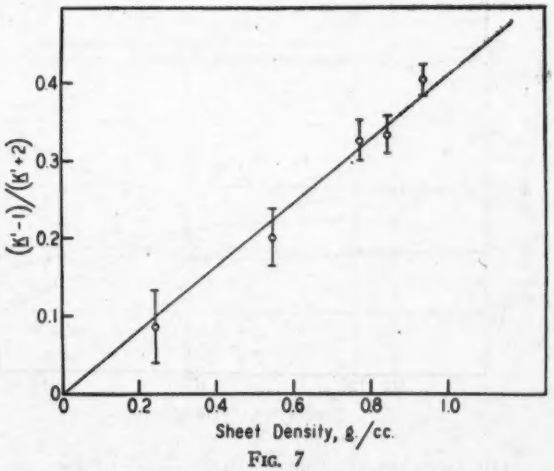

FIG. 7
Relation between Sheet Density and $(K-1/(K+2)$

Effects of Metallic Cations

The work of McLean *(12)* has indicated strongly that the inorganic constituents of paper may be chiefly metallic ions held by carboxyl groups. Further, he showed that acid washing would remove most of this material and that, by treating the washed pulps in salt solutions, the ash contents could be restored to very nearly the original values. It appeared that this technique could be employed to exercise some control over the amount of cationic material adsorbed by the pulps, which could then be tested to discover whatever influence the metal ions had on the electrical properties.

A sample of Pulp III was beaten for 30 minutes in the Lampén mill. The pulp was then extracted for two periods of 4 and 17 hours, respectively, with cold 0.05 *N* hydrochloric acid, at 1% consistency, and with slow agitation. Following this acid treatment, the pulp was extracted for 10 hours with boiling distilled water, using three changes of water. The washed pulp was divided into portions and several sets of sheets

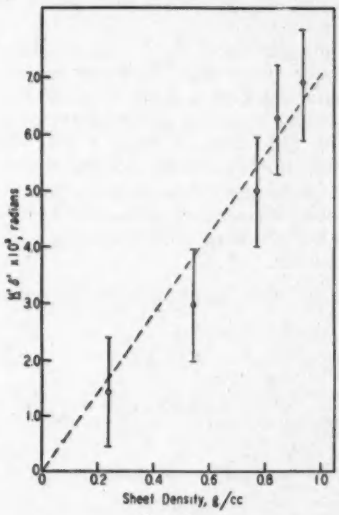

FIG. 8
Loss Factor vs. Density

were prepared, as follows: Set 1, sheets made from the extracted pulp. Set 2, sheets prepared from the extracted pulp treated for 3.5 hours at 2% consistency in cold *N* calcium chloride solution, then filtered and washed with distilled water until the extract gave no precipitation on addition of silver nitrate. Set 3, sheets prepared exactly as in Set 2, except that the time in contact with the salt solution was 20 hours. Set 4, sheets made from the beaten but unextracted pulp, using tap water instead of distilled water. Set 5, sheets made from acid-washed pulp (remainder from Set 1) given a 20-hour extraction in cold distilled water. Set 6, sheets prepared from beaten but not acid-washed pulp, extracted for 20 hours with cold distilled water, 10 hours with boiling distilled water, and finally for an additional 20 hours with cold distilled water.

The results of electrical tests on these papers are

TABLE III.—THE INFLUENCE OF VARIOUS TREATMENTS ON UNBLEACHED KRAFT PULP

Set	Ash: Pulp, %	Ash: Sheets, %	K''	$K''\delta'' \times 10^3$: 1,000 cycles	$K''\delta'' \times 10^3$: 10,000 cycles	$\delta'' \times 10^3$: 1,000 cycles	$\delta'' \times 10^3$: 10,000 cycles
1	0.00	0.19	2.30	3.55	3.74	1.54	1.63
2	0.14	0.17	2.49	4.25	5.34	1.70	2.14
3	0.22	0.29	2.48	4.45	5.36	1.80	2.16
4	0.54	0.54	2.41	4.62	5.27	1.92	2.19
5	0.00	0.19	2.13	3.25	3.67	1.53	1.72
6	...	...	2.25	3.71	4.45	1.65	1.98

presented in Table III. Acid washing and, to a lesser extent, water extraction, are shown to be effective in reducing the power factor of kraft pulp.

In preparing these sheets some contamination of the material was unavoidable; the sheet mold appeared to be the principal source of this contamination in spite of efforts to keep it scrupulously clean. It will also be noted that, even with prolonged exposure to relatively concentrated calcium chloride solutions, the ash content of the pulp could be brought to only about half its original value. It is probable that this was due to the removal of part of the organic material responsible for cation adsorption.

Two additional sets of sheets (Sets 7 and 8) were prepared from an acid-treated sample of pulp, the only difference between the sets being the addition of small amounts of calcium chloride to the sheets of Set 8. Insufficient salt was added to fully utilize the adsorbing capacity of the samples; it is presumed, therefore, that all the metal ions added were taken up by the pulp.

The results for these sheets are tabulated in Table IV. At power frequencies increase in cation content is accompanied by only a slight increase in loss factor, but considerable increase is noted above 1000 cycles per second. The data of both Tables III and IV indicate that the dielectric constant is a slow but increasing function of ash content. These results are in accord with the theory advanced by Murphy and Lowry for the action of ions in the interstitial systems of the dielectric.

TABLE IV.—THE INFLUENCE OF SALT CONTENT

Property	Set 7	Set 8
Ash of sheets, %	0.13	0.23
K''	2.39	2.48
$K''\delta'' \times 10^3$, radians		
60 cycles/sec.	4.77	4.80
200 cycles/sec.	4.55	4.62
1000 cycles/sec.	4.38	4.62
10,000 cycles/sec.	5.45	6.85
$\delta'' \times 10^3$, radians		
60 cycles/sec.	2.00	1.93
200 cycles/sec.	1.91	1.86
1000 cycles/sec.	1.84	1.86
10,000 cycles/sec.	2.29	2.76

The Influence of Lignin Content

Sets of sheets were prepared from the pulps listed in Table I, and from the bleached Pulp IV. Data for these sheets are presented in Table V.

TABLE V.—INFLUENCE OF LIGNIN CONTENT

Property	Pulp I Set 9	Pulp II Set 10	Pulp III Set 11	Pulp IV Set 12
Ash, %	0.248	0.204	0.186	...
Lignin, %	6.80	6.00*	2.28	Bleached
K''	2.41	2.41	2.41	2.20
$K''\delta'' \times 10^3$, radians				
60 cycles/sec.	6.70	6.25	5.92	4.98
200 cycles/sec.	5.62	5.52	5.02	4.33
1000 cycles/sec.	6.53	5.30	5.17	4.45
10,000 cycles/sec.	8.60	7.74	6.20	5.68
$\delta'' \times 10^3$, radians				
60 cycles/sec.	2.78	2.69	2.45	2.27
200 cycles/sec.	2.33	2.29	2.08	1.97
1000 cycles/sec.	2.71	2.20	2.14	2.02
10,000 cycles/sec.	3.56	3.21	2.57	2.58

* This value of lignin content was estimated from the permanganate number, which was very close to that for Pulp I.

Part of the rapid rise of loss factor at the upper end of the frequency range, particularly for Sets 9 and 10, can be attributed to the presence of inorganic material. However, the consistent differences exhibited at all frequencies are taken to indicate that lignin is partially responsible for the dielectric losses in kraft paper. The presence of other constituents, such as the hemicelluloses, may be partially responsible for the observed trend with lignin content, although the pentosans content in Pulps I, II, and III (Table I) are similar.

The Properties of Native Lignin

It is appreciated that lignin isolated from wood or pulp may not behave, under electrical stresses, in the same way as lignin associated with cellulose in fibers. Nevertheless it seemed desirable to investigate the properties of a sample of native lignin which was isolated from black spruce by Dr. Brauns of The Institute of Paper Chemistry.

The lignin, which exists in the form of a white powder, was spread as evenly as possible in a thin layer over the lower electrode. With the upper electrode in the raised position, the system was evacuated at room temperature for a period of 24 hours at a pressure of about 1 micron. The plate was then lowered, and the electrical measurements were made at temperatures of 25°, 45°, 70°, and 82° C. Five-hour equilibration times were allowed between each set of measurements.

The data are presented in Table VI and Fig. 9.

The density of the mass of lignin (roughly 0.15 gram per cc.) could not be determined closely enough to allow correction of the data to the standard density of 0.8 gram per cc. by the Clausius-Mosotti relation. However, the trends exhibited by the material are of interest. There is distinct dispersion of loss angle and loss factor with change of frequency, and raising the temperature causes the maxima of the curves to shift

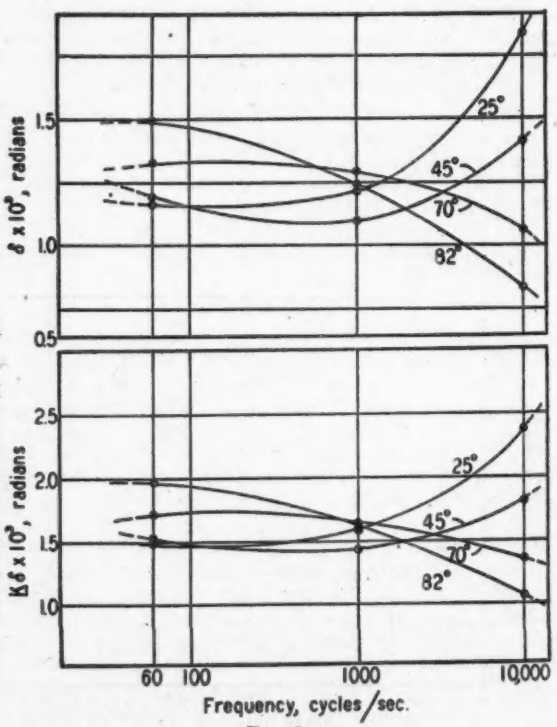

FIG. 9

Loss Factor and Loss Angle for Native Lignin at Different Temperatures and Frequencies

to lower frequencies. This behavior is characteristic of polar compounds. It is conceivable that these effects are due to the highly polar hydroxyl and carbonyl groups known to exist in lignin.

TABLE VI.—PROPERTIES OF NATIVE LIGNIN AT DIFFERENT TEMPERATURES

Cycles/sec.	25° C.*	45° C.*	70° C.*	82° C.*
		K		
60	1.28	1.29	1.30	1.33
1000	...	...	1.29	1.30
10,000	...	...	1.27	1.29
		$\delta \times 10^3$, radians		
60	1.17	1.18	1.31	1.48
1000	1.20	1.10	1.27	1.24
10,000	1.84	1.40	1.06	0.83
		$K\ \delta \times 10^3$, radians		
60	1.50	1.53	1.71	1.98
1000	1.54	1.42	1.64	1.62
10,000	2.36	1.81	1.34	1.07

* Estimated temperature of lignin.

Although the density of the sample was very low, the observed values of dielectric constant and loss angle were substantially greater than values of these properties for the least dense paper tested (first row, Table II). At a density of 0.8 gram per cc., therefore, lignin could be expected to have much higher values of dielectric constant and loss angle than paper of the same density. This correlates with the evidence of Table V, which shows these properties to increase in value with increases of lignin content.

Summary

The results which have been presented here may be briefly summarized, as follows:

The hysteresis loops of loss angle vs. temperature offer evidence that even the extreme drying conditions imposed were not sufficiently rigorous to yield results entirely characteristic of the cellulosic substance itself. The water which remains may originate largely from the decomposition suggested by the work of Murphy and McLean.

The agreement with the Clausius-Mosotti relationship which has been shown to exist is of value in that it permits estimation of the specific inductive capacities of papers of different densities. This information should be especially useful in further fundamental study of paper dielectrics.

Metallic ions have been shown to be responsible for a substantial portion of the loss factor associated with paper, especially at frequencies well above power frequencies.

Finally, there is evidence that lignin, with its highly polar hydroxyl and carbonyl groups, may be responsible for a disproportionately large part of the loss factor of paper. These last two points suggest that different types of paper might be desirable for different applications. Thus, unbleached pulp might be best suited for d. c. service on account of its high ion-exchange capacity, whereas bleached fibers might be best for a. c. applications.

It should be emphasized that since these results apply only to unimpregnated paper, their immediate application to impregnated papers is unwarranted. Additional research will be required to show whether the factors which have been shown to affect the behavior of unimpregnated paper have similar effects on the performance of paper-impregnant combinations.

Acknowledgment

The authors wish to acknowledge with thanks the invaluable assistance given by Dr. J. A. Van den Akker, Dr. George R. Sears, Dr. C. J. West, and others of The Institute of Paper Chemistry, in the carrying on of this work and the writing up of the results.

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Flexural Resistance and Deflection of Fiberboard*

Revision of TAPPI Suggested Method T 469 sm-45

This method is for determining the flexural resistance and the deflection of fiberboards which are subjected in use to high stresses, such as binders board, insulating board, wall board, and hard-pressed structural board. The method is suitable for measuring the stiffness of a sheet of fiberboard as such but the results are not in themselves a measure of the expected rigidity or resistance to compression of structures made from the board and should not be used for that purpose.

* This revised method is suggested by the Paper Testing Committee as being the most suitable to date. It is *not*, however, a TAPPI standard. Criticisms are earnestly requested and should be sent to R. B. Macdonald, Secretary, Technical Association of the Pulp and Paper Industry, 122 E. 42nd St., New York 17, N. Y. Reprints may be obtained from the secretary at 25 cents each.

Apparatus

1. *Tensile Tester* as specified in TAPPI Standard T 404 m, preferably equipped with a recording device which gives a graphic record of the applied load and deflection. (*See* note below.)

2. *Flexural Loading Device.* This device, shown in Fig. 1, is in two parts. The stirrup, *A*, is provided with a tab for clamping in the upper clamp of the tensile tester. The bearing surface at the bottom of the stirrup is a smooth metal cylinder. The stressing attachment, *B*, carries an inverted stirrup at each end, similar to stirrup *A*, such that the cylinders are parallel with each other, and a tab in the center to be clamped in the lower (stressing) clamp of the tensile tester.

The span (distance between centers of the two cylinders in attachment *B*) must be suitably chosen according to the rigidity of the material to be tested and the capacity of standard tensile testing apparatus.

The following cylinder diameters and spans shall be used for the fiberboards designated:

	Diameter of Cylinders, inch	Span, inches
Binders board (*2, 3*)	1/8	3
Insulating board (*1, 4*)	3/4	12
Wallboard (*1, 5, 6*)	3/4	12
Hard-pressed structural board (*7*)	3/4	8

Note: Any equivalent means of applying a measurable load to the center of a supported strip of the specimen and measuring the deflection may be used.

3. *Scale.* If the tensile tester or other apparatus used is not equipped with a device for recording the deflection, it may be measured with a scale graduated in 0.01 inch.

Test Specimen

The considerations applying to the span length and the diameter of the cylinders of the stirrups also apply to the dimensions of the test specimens. The dimensions of test specimens of the following fiberboards shall be as follows:

	Length, inches	Width, inches
Binders board (*2, 3*)	5	1
Insulating board (*1, 4*)	18	1
Wallboard (*1, 5, 6*)	18	3
Hard-pressed structural board (*7*)	12	3

The test specimens shall be cut accurately and parallel to within 1/32 inch, and with clean-cut edges, in each principal direction of the fiberboard.

The specimens shall be conditioned for testing according to TAPPI Standard T 402 m.

Procedure

The tests shall be made in an atmosphere conditioned according to TAPPI Standard T 402 m.

Using the tensile tester, fasten attachment *B* in the lower (stressing) clamp of the tensile tester with the axes of the two cylinders in a plane perpendicular to the direction of movement of the clamp. Fasten stirrup *A* in the upper clamp with its cylinder parallel to the other two and so that it will load the specimen at midspan. Counterweight the stirrup *A*, or determine the scale correction necessary to compensate for its weight. Run up the lower clamp with the attachment *B* until the specimen can be inserted, without bending it, under the two end cylinders and over the one at midspan, leaving equal lengths projecting at the two ends. Apply the load according to TAPPI Standard T 404 m until the specimen breaks or until after a maximum load has been reached. The rate of loading shall be such that the maximum is reached in not less than 30 nor more than 45 seconds.

If the testing instrument does not have a recording device for the amount of deflection at maximum load, measure it with the scale. Allow one end of the scale to rest on the lower clamp and read the scale opposite a reference line on the upper clamp at the instant loading is begun, at chosen intervals

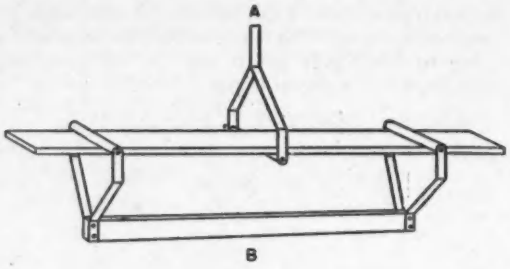

FIG. 1
Flexural Loading Device

of loading, and at the instant of failure or maximum load.

Tests shall be made on not less than five specimens cut from each of the two principal directions of the board.

Report

The results shall be reported to two significant figures as the average flexural resistance (load at failure, or maximum load in case there is no failure) in pounds, and the deflection in inches in both principal directions of the sample for the dimensions of the specimen beams tested.

The report may also give the load corresponding to various increments of deflection or the deflection at various load increments.

Additional Information

The modulus of transverse strength and modulus of rupture may be calculated by the following formulas:

Modulus of transverse strength, lb. per sq. in. $= \frac{3Pl}{2bd^2}$

Modulus of rupture, lb. per sq. in. $= \frac{3Wl}{2bd^2}$

where P = load at elastic limit, pounds
W = load at rupture, pounds
d = thickness adjacent to rupture, inch
b = width of test specimen, inches
and l = length of span, inches

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TAPPI Notes

William Martney, formerly of the Northwest Paper Company is now senior research chemist, Central Technical Department, Crown Zellerbach Corporation, Camas, Wash.

The TAPPI Delaware Valley Section will meet at the Engineers Club, Philadelphia, Pa. on Friday evening, January 4th. Griffith Clark, Vice President of Precision Built Homes, will present a paper on The Use and Abuse of Fiber Board in Modern Home Construction. A 30 minute film on the subject will also be shown.

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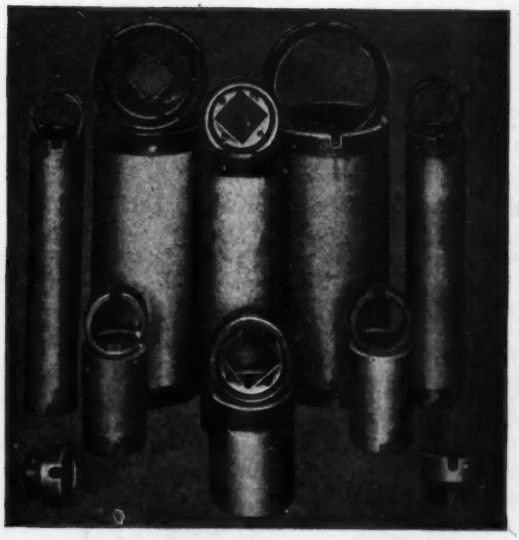

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CORINTH, N. Y.

New York Paper and Pulp Market Review

Production and Demand For Paper Heavy—Output Is Now Close To Capacity — Wood Pulp Situation Slowly Improving — Rag Markets Active — Bad Weather Slows Collections of Waste Paper.

Office of the PAPER TRADE JOURNAL,
Wednesday, December 26, 1945.

Wholesale demand for all major paper products continues heavy. Current production is high at about 99% of six-day week capacity. Reports this week from manufacturers' representatives, jobbers, and general paper merchants reflect strong convictions that the course of business and trade is rapidly improving and that the return to a more normal level, with the trend to a very prosperous future, will be more pronounced at the beginning of 1946.

The index of general business activity for the week ended December 15 rose to 131.1, from 129.8 in the preceding week, compared with 143.2 for the corresponding week in 1944. The index of paperboard production was 158.5, compared with 157.8 in the preceding week, and with 153.8 for the corresponding week in 1944.

Paper production for the week ended December 15 was estimated at 99.0%, compared with 89.3% for 1944, with 89.9% for 1943, with 87.9% for 1942, and with 107.3% for the corresponding week in 1941.

Paperboard production for the week ended December 15 was 93.0%, compared with 94.0% for 1944, with 96.0% for 1943, with 85.0% for 1942, and with 101.0% for the corresponding week in 1941.

Wood Pulp

The wood pulp supply situation is slowly improving. Demand continues strong. Output in October was about 0.9% higher than in the preceding month. Although October receipts of pulpwood were some 192,398 cords under September total receipts for 1945 are now estimated at 17,358,471 cords of 128 cubic feet, 10% of which is imported wood.

Rags

Mill demand for cotton cuttings continues heavy this week. The supply situation, which two months ago was expected to reflect considerable improvement at this date, as more cotton goods were said to be going into garments, is little changed. Supply is inadequate to meet current demand. Prices are strong at ceiling levels.

The old cotton rag market is strong. Demand from all consumers is heavy for all grades. Many roofing felt mills report inability to purchase all the rag stock required to meet increasing demands for their products. Prices are strong.

Old Rope and Bagging

No important change in the old rope market has been reported this week.

Demand for old bagging is reported in some quarters as relatively good, with supply limited. Prices on gunny and scrap bagging are firmer, with no important changes reported.

Old Waste Paper

Mill demand for all grades of paper stock continues heavy this week. Because of the unfavorable weather in the past two weeks collections are reported down some 10%. The market is very srotng in tone and prices are firm at ceiling levels.

Holyoke Strike Vote Averted

HOLYOKE, Mass., December 24, 1945—At a mass meeting of the members of Eagle Lodge of Papermakers and Local 226, Holyoke Paper Mill Workers, attended by 750 of the total membership of 1750, December 16, the counterproposal of the manufacturers was accepted, thereby averting a strike which has been threatening the paper industry here for several weeks. A base wage adjustment of seven cents an hour for all workers receiving 69 cents an hour or less and an increase of six cents an hour for all workers receiving 70 cents an hour or more was accepted. These adjustments are retroactive to Nov. 19.

With the quick and unexpected settlement of the wage demands the union members called off the strike vote which was scheduled for Wednesday under the Smith-Connally act. The decision of the workers to accept the latest counterproposal of the manufacturers came after four representatives of the paper mill owners appeared before the union members and pleaded their cases. The unions asked for a 15-cents-an-hour increase and the manufacturers at a later conference offered a counter proposal of five-cents-an-hour increase. This was rejected at a mass meeting of the two unions and the proposal which was accepted was submitted to the committees of the unions last week but the details were not made public until the mass meeting on the 16th.

Paper Men to Meet at Kazoo January 10

KALAMAZOO, Mich., December 24, 1945—The eleventh annual "Paper Makers Get-Together" sponsored jointly by the Kalamazoo Valley Section of TAPPI and the Michigan Division of the American Pulp and Paper Mills Superintendents Association is to be held Thursday, January 10, 1946, at the Park-American Hotel. The speaker of the evening will be Dr. Otto Kress, Technical Director, Institute of Paper Chemistry. He will talk on conditions in the European paper mills. Frank French, President of the French Paper Company, will be the toastmaster of the evening.

Strathmore Holds Christmas Party

SPRINGFIELD, Mass., December 22, 1945—More than 150 employes of the Strathmore Paper Company had their annual Christmas party at the Bridgway hotel where they received a Christmas bonus from the management. Walter Trotman was chairman of the committee on arrangements and master of ceremonies.

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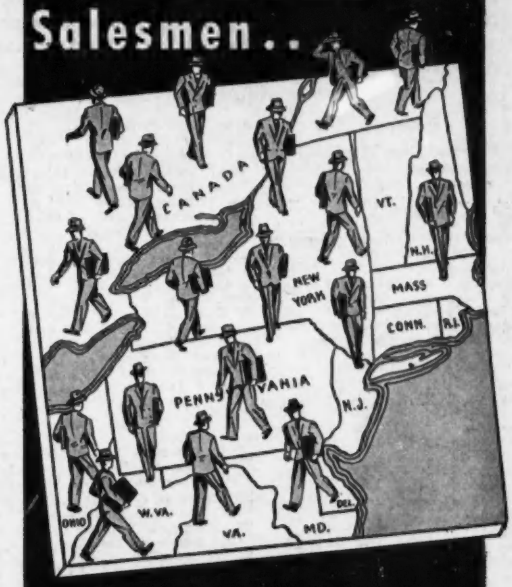

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MISCELLANEOUS MARKETS

Office of the PAPER TRADE JOURNAL,
Wednesday, December 26, 1945.

BLANC FIXE—The market for blanc fixe is reported unchanged for the week. Current demand continues fair. The pulp is currently quoted at $40 per ton, in barrels, at works; the powder is currently quoted at $60 per ton.

BLEACHING POWDER—Demand is currently reported active. September output of 1,083,000 lbs. below August. Bleaching powder is currently quoted at from $2.50 to $3.10 per 100 pounds. All prices in car lots, in drums, f.o.b. works.

CASEIN—OPA maximum prices on processed acid-precipitated casein are as follows: 10,000 pounds or more, 24 cents per pound; 2,000 pounds, 24¼ cents per pound; less than 2,000 pounds, 24¾ cents per pound, f.o.b. shipping point. Imported, 24 cents per pound.

CAUSTIC SODA—Supply situation continues short. No material improvement reported this week. Solid caustic soda is currently quoted at $2.30 per 100 pounds. The flake and ground are currently quoted at $2.70 per 100 pounds. All prices in car lots, in drums, f.o.b. works.

CHINA CLAY—Demand for some grades of china clay is reported fair this week. Domestic filler clay is currently quoted at from $7.50 to $15 per ton; coating clay is quoted at from $12 to $22 per ton, at mines. Imported china clay is currently quoted at from $13 to $25 per long ton, ship side.

CHLORINE—Demand heavy. Production gaining. Current market is tight. Chlorine is currently quoted at $1.75 per 100 pounds, in single-unit tank cars, f.o.b. works.

ROSIN—No offerings or sales. OPA prices: "G" gum rosin at $6.74 per 100 pounds, in barrels, Savannah. "FF" wood rosin is currently quoted at $6.70 per 100 pounds in barrels, New York. Average price of 70% gum rosin size is currently offered at $6.95 per 100 pounds, f.o.b. works.

SALT CAKE—Demand reported moderate. Quotations on salt cake continue to remain unchanged. Domestic salt cake is currently quoted at $15 per ton; chrome cake at $16 per ton.

SODA ASH—Market demand for soda ash continue heavy. Market tight. Bulk shipments fairly prompt. Bagged lots very slow. Prices continue unchanged. Prices on soda ash in car lots, per 100 pounds, are as follows: in bulk, $.90; in paper bags, $1.05; and in barrels, $1.35.

STARCH—Market supply of cash corn lower this week and under last year. Shipments lower. Corn prices are steady. Starch quotations continue unchanged. Pearl is currently quoted at $3.72 per 100 pounds. The powdered grade is currently quoted at $3.83 per 100 pounds. All prices f.o.b. Chicago.

SULPHATE OF ALUMINA—Supply situation reported favorable. Quotations are unchanged. Prices on the commercial grades are quoted at from $1.15 to $1.25 per 100 pounds. The iron free is currently quoted at $1.75 per 100 pounds. All prices in car lots, in bags, f.o.b. works.

SULPHUR—Demand is reported active for sulphur. Quotations on all grades continue unchanged. Annual contracts are currently quoted at $16 per long ton, f.o.b. mines. The current contract prices at Gulf Ports remains unchanged at $17.50 per long ton.

TALC—The market for domestic talc is reported fair this week. Quotations unchanged. Domestic grades are quoted at from $16 to $21 per ton, at mines. Canadian $24 per ton. All prices in car lots.

MARKET QUOTATIONS

All market quotations, excepting those otherwise designated as official OPA maximum prices, are based on the manufacturers' price level as of October 1-15, 1941; maximum wholesale prices are based on the merchants' maximum prices for stipulated quantities at a quoted price to all customers of a like class, as shown by the merchant's sales records of goods delivered during March, 1942. A merchant's price list in effect in March 1942, showing quotations of actual shipments, will establish the current maximum prices.

Paper

(Delivered New York)

Standard News per ton—

Roll, contract	*$67.00	@	—
Sheets	75.00	@	—

* OPA Maximum Price.

Kraft—per cwt.—Carload Quantities Zone A, Delivered

Superstandard Wrapping	*$5.25	@	—
No. 1 Wrapping	*5.00	"	—
Standard Wrapping	*4.75	"	—
Standard Bag	*4.375	"	—

* OPA Manufacturers' Prices.

Tissues—Per Ream—Carlots

White No. 1	1.12½	"	—
White No. 1 M. G.	1.10	"	—
White No. 1½	1.00	"	—
White No. 2	.90	"	—
Anti-Tarnish M.F.	1.20	"	—
Colored	—	"	—
Kraft	.95	"	—
Manila	.90	"	—

Toilet—1 M. Sheets—Per Case

Unbleached	4.25	"	—
Bleached	5.70	"	—
Unbl. Toilet, 1 M.	4.16	"	—
Bleached Toilet	5.70	"	—

Paper Towels, Per Case—

Unbleached, Jr.	2.20	"	—
Bleached, Jr.	3.20	"	—

Manila—per cwt.—C. l. f. a.

No. 1 Jute	11.25	@	—
No. 1 Manila Wrapping, 35 lb.	6.00	"	6.25

Boards, per ton—

News	*50.00	@	—
Chip	*50.00	"	—
Sgl. Mla. Lt. Chip	*62.00	"	—
White Pat. Coated	*75.00	"	—
Kraft Liners 50 lb.	*63.00	"	—
Binders Boards	84.00	"	116.00

* OPA Base Prices per 10 tons. Less than 10 tons but over 3 tons, add $2.50; three tons or less, add $5; regular 35-39 basis, add $5.; basis 40-49, add $2.50; basis 91-100, add $2.50; basis 101-120, add $5.

The following are representative of distributors' resale prices:

Rag Content Bonds and Ledgers—White, Assorted Items, Delivered in Zone 1:

	Bonds		Ledgers	
100% Rag Ext. No. 1	$39.10	@ $46.00	$40.25	@ $47.25
100% Rag	32.20 "	37.75	33.35 "	39.25
85% Rag	.... "	....	29.90 "	35.00
75% Rag	23.00 "	27.00	24.15 "	28.25
65% Rag	.... "	....	22.80 "	27.75
50% Rag	18.70 "	22.75	19.90 "	24.25
25% Rag	16.40 "	20.00	17.35 "	21.50

Colors at $1.00 cwt. extra.

Sulphite Bonds and Ledgers—White, Assorted Items, Delivered in Zone 1:

	Bonds		Ledgers	
No. 1	$10.55	@ $12.75	$11.70	@ $14.25
No. 2	9.65 "	11.75	9.80 "	13.25
No. 3	9.20 "	11.25	13.35 "	12.50
No. 4	8.90 "	10.75	10.05 "	12.25

Colors $1.00 cwt. extra.

Free Sheet Book Papers—White, Cased Paper. Delivered in Zone 1:

No. 1 Glossy Coated	$13.65	@	$15.20
No. 2 Glossy Coated	12.40 "		14.00
No. 3 Glossy Coated	11.60 "		12.80
No. 4 Glossy Coated	11.15 "		12.75
No. 1 Antique (watermarked)	10.25 "		11.75
No. 2 Offset	9.60 "		11.00
A Grade E. F.	9.35 "		10.75
A Grade S. & S. C.	9.60 "		11.00
B Grade E. F.	8.85 "		10.25
B Grade S. C.	9.10 "		10.50
C Grade E. F.	8.55 "		9.75
C Grade S. C.	8.80 "		10.00
D Grade E. F.	8.25 "		9.50
D Grade S. & S. C.	8.50 "		9.75

Ivory & India at $.50 cwt. extra.

Wood Pulp

OPA Maximum Prices and Canadian Manufacturers Prices, Less Freight Not Exceeding OPA Allowances.

Bl. Softwood Sulphite			$86.50
Unbl. Softwood Sulphite			74.00
Bl. Hardwood Sulphite			83.50
Unbl. Hardwood Sulphite			71.50
Bl. Mitscherlich			81.00
Unbl. Mitscherlich	72.00	@	83.00
N. Bleached Sulphate			86.00
S. Bleached Sulphate			79.00
N. Semi-Bleached Sulphate			82.00
S. Semi Bleached Sulphate			75.00
N. Unbl. Sulphate			73.00
S. Unbl. Sulphate			69.50
Bl. Soda			76.00
Unbl. Soda			73.00
Groundwood			50.00

Transportation Allowances

Applying to Producers of Wet Wood Pulp.

	Below 50% Air Dry Weight
Northeast	$13.50
Lake Central	13.50
Southern	16.00
West Coast (in area)	10.50
West Coast (out area)	16.50

	50%-80% Air Dry Weight
Northeast	11.50
Lake Central	11.50
Southern	14.00
West Coast (in area)	9.50
West Coast (out area)	15.50

Applying to Producers of Dry Wood Pulp.

	Above 80% Air Dry Weight
Northeast	$8.50
Lake Central	8.50
Southern	11.00
West Coast (in area)	7.50
West Coast (out area)	13.50

Should freight charges actually exceed these allowances, the difference may be added to the maximum prices.

Domestic Rags

New Rags

(Prices to Mill f. o. b. N. Y.)

Shirt Cuttings—			
New White, No. 1	6.50	@	7.25*
Silesias No. 1	—	"	5.75*
New Unbleached	6.75	"	7.50*
Blue Overall	—	"	3.50*
Fancy	—	"	3.50*
Washables	—	"	3.00*
Bleached Khaki Cuttings	—	"	4.25*
Unbleached Khaki Cuttings	—	"	3.90*

*OPA Maximum Prices

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Old Rags

White, No. 1—			
Repacked	*2.80	"	—
Miscellaneous	*3.20	"	—
White, No. 2—			
Repacked	*2.90	"	—
Miscellaneous	*2.65	"	—
Thirds and Blues—			
Repacked	*2.20	"	—
Miscellaneous	*1.30	"	—
Roofing Rags—			
No. 1	*1.55	"	—
No. 2	*1.45	"	—
No. 3 (bagging)	*1.35	"	—
No. 4	*1.35	"	—
No. 5A	*1.35	"	—
Old Manila Rope	5.75	"	—

* OPA Maximum Prices.

Foreign Rags

Pre-War Quotations
All Prices Nominal

New Rags			
New Dark Cuttings	2.25	@	2.40
New Mixed Cuttings	2.00	"	2.20
New Light Silesias	5.90	"	5.75
Light Flannelettes	5.50	"	5.75
New White Cuttings	7.00	"	7.50
New Light Oxfords	4.00	"	4.50
New Light Prints	3.00	"	3.25
Old Rags			
No. 1 White Linens	7.50	"	8.50
No. 2 White Linens	6.50	"	7.50
No. 3 White Linens	4.50	"	—
No. 4 White Linens	2.25	"	2.25
No. 1 White Cottons	4.25	"	4.75
No. 2 White Cottons	3.25	"	3.75
No. 3 White Cottons	2.50	"	3.00
No. 4 White Cottons	1.90	"	2.20
Extra Light Prints	2.00	"	2.40
Med. Light Prints	1.75	"	2.15
Med. Light Prints	1.55	"	1.95
Dutch Blue Cottons	2.25	"	2.50
French Blue Linens	1.00	"	—
Checks and Blues	2.00	"	—
Linsey Garments	1.90	"	2.00
Dark Cottons	1.50	"	1.60
Old Shapporices	1.30	"	1.45
New Shapporices	1.45	"	1.50
French Blues	2.25	"	2.50

BAGGING

(Prices to Mill, f. o. b. N. Y.)

Gunny No. 1—			
Foreign	Nominal		
Domestic	3.25	@	3.30
Wool Tares, light	3.25	"	3.50
Wool Tares, heavy	3.50	"	3.75
Bright Bagging	3.25	"	3.50
Manila Rope—			
Foreign	—	"	—
Domestic	*5.75	"	—
Jute Threads	5.50	"	—
No. 1 Sisal Strings	*4.00	"	—
Mixed Strings	2.00	"	—

* OPA Maximum Prices.

Old Waste Papers

(F. o. b. New York)

OPA Maximum Prices, Baled

No. 1 Hard White Envelope Cuts, one cut	3.37½	@	—
No. 1 Hard White Envelope Cuts	3.12½	"	—
No. 1 Hard White Shavings, unruled	2.87½	"	—
No. 1 Hard White Shavings, ruled	2.50	"	—
Soft White Shavings, one cut	2.87½	"	—
No. 1 Soft White Shavings	2.50	"	—
Soft White Shavings, Misc.	2.15	"	—
No. 1 Fly Leaf Shavings	1.67½	"	—
No. 2 Fly Leaf Shavings	1.12½	"	—
No. 1 Groundwood Fly Leaf Shavings	1.25	"	—
No. 2 Mixed Groundwood Fly Leaf Shavings	.90	"	—
Mixed Colored Shavings	.75	"	—
Mixed Groundwood Colored Shavings	.90	"	—
Overissue Magazines	1.67½	"	—
No. 1 Heavy Books & Magazines	1.92½	"	—
Mixed Books	1.10	"	—
No. 1 White Ledger	2.30	"	—
No. 2 Mixed Ledger, colored	2.00	"	—
New Manila Envelope Cuttings, one cut	2.87½	"	—
New Manila Envelope Cuttings	2.65	"	—
Extra Manilas	1.95	"	—
Mixed Kraft, Env. & Bag Cuttings	2.75	"	—
Kraft Envelope Cuttings	3.25	"	—
Triple Sorted, No. 1 Brown Soft Kraft	2.50	"	—
New 100% Kraft Corrugated Cuttings	2.25	"	—
No. 1 Assorted Old Kraft	1.75	"	—
New Jute Corrugated Cuttings	.90	"	—
Old 100% Kraft Corrugated Containers	1.75	"	—
Old Corrugated Containers	1.40	"	—
Box Board Cuttings	.72½	"	—
White Blank News	1.65	"	—
Overissue News	1.10	"	—
No. 1 News	1.00	"	—
No. 1 Mixed Paper	.95	"	—
Old Corrugated Containers	.82½	"	—
Mill Wrappers	1.10	"	—

Twines

All Prices Nominal

(F. o. b. Mill)

(Soft Fiber)

Coarse Polished—			
India	.21	@	—
White Hemp	.21	"	—
Fine Polished—			
Fine India	.26	"	—
Unpolished—			
Box	.17½	"	—
Paper Makers	.17	"	—
Tube Rope	.19	"	—
Wall Paper	.20½	"	—
Wrapping	.23	"	—
Soft Fiber Rope	.19	"	—
Cotton	.25	"	—
(Hard Fiber)			
Medium Java	.18	"	—
Mex. Sisal	.16	"	—
Manila	—	"	—

PHILADELPHIA

Domestic Rags (New)

(Price to Mill)

Shirt Cuttings—	
New White No. 1	.07¼
New White No. 2	.05¾
Light Silesias	.05¾
Black Silesias, soft	.03¾
New Unbleached	.07½
Washable Prints	.04¼
Washable No. 1	.03
Blue Overall	.05½
Cottons—According to grades—	
Washable Shredding	.01¾
Fancy Percales	.04¾
New Black Soft	.03¾
Khaki Cuttings—	
Unbleachable Cotton Cuttings	.03½
Bleachable Cotton Cuttings	.04¼
Men's Corduroy	.03½
Ladies' Corduroy	.03
Cottonades	.03¾

Domestic Rags (Old)

White No. 1—Repacked	1.80	@	—
Miscellaneous No. 1	1.20	"	—
Miscellaneous No. 2	2.65	"	—
White No. 2—Repacked	2.90	"	—
Thirds and Blues—Miscellaneous	1.80	"	—
Repacked	2.20	"	—
Black Stockings—(Repeat)	Nominal		
Roofing Stock—			
Foreign No. 1	Nominal		
Domestic No. 1	1.55	"	—
Domestic No. 2	1.45	"	—
Roofing Bagging	1.25	"	—
Old Manila Rope	5.75	"	—

Bagging

(F. o. b. Phila.)

Gunny No. 1—			
Foreign	Nominal		
Domestic	3.00	@	3.90
No. 1 Clean bright—			
Sisal Strings	.04	"	—
No. 2 Clean bright—			
Sisal Strings	.03	"	—
Sisal Jute	.02½	"	.02¾
Scrap—			
No. 1	3.25	"	3.50
No. 2	1.75	"	1.80
Wool Tares, heavy	4.00	"	4.25
No. 1 New Light Burlap	3.00	"	4.00
New Burlap Cuttings	1.75	"	4.00

Old Papers

(F. o. b. Phila.)

OPA Maximum Prices, Baled

No. 1 Hard White Envelope Cuts, one cut	3.37½	@	—
No. 1 Hard White Shavings, unruled	2.87½	"	—
Soft White Shavings, one cut	2.50	"	—
White Blank News	1.65	"	—
Soft White Shavings, Misc.	2.15	"	—
No. 1 Hard White Shavings, ruled	2.50	"	—
No. 1 Fly Leaf Shavings	1.67½	"	—
No. 2 Fly Leaf Shavings	1.12½	"	—
No. 1 Groundwood Fly Leaf Shavings	1.25	"	—
No. 2 Groundwood Fly Leaf Shavings	.90	"	—
Mixed Colored Shavings	.75	"	—
No. 1 Heavy Books & Magazines	1.92½	"	—
Overissue Magazines	1.67½	"	—
New Manila Envelope Cuttings	2.65	"	—
No. 1 Assorted Old Kraft	1.75	"	—
No. 1 Mixed Paper	.95	"	—
Box Board Cuttings	.72½	"	—
Kraft Corrugated Cuttings	2.25	"	—
Old Corrugated Containers	1.40	"	—
Overissue News	1.00	"	—
No. 1 News	1.00	"	—

BOSTON

Old Papers

(F. o. b. Boston)

OPA Maximum Prices, Baled

No. 1 Hard White Shavings, unruled	2.87½	@	—
No. 1 Hard White Shavings, ruled	2.50	"	—
Soft White Shavings, Misc.	2.15	"	—
No. 1 Fly Leaf Shavings	1.67½	"	—
No. 2 Fly Leaf Shavings	1.12½	"	—
No. 1 Groundwood Fly Leaf Shavings	1.25	"	—
No. 2 Groundwood Fly Leaf Shavings	.90	"	—
Mixed Colored Shavings	.75	"	—
New Manila Envelope Cuts, one cut	2.87½	"	—
Hard White Envelope Cuts, one cut	3.37½	"	—
Triple Sorted No. 1 Brown Soft Kraft	2.50	"	—
Mixed Kraft Env. & Bag Cuttings	2.75	"	—
Kraft Envelope Cuttings	3.25	"	—
No. 1 Heavy Books & Magazines	1.92½	"	—
New Manila Envelope Cuts, one cut	2.87½	"	—
New Manila Envelope Cuttings	2.65	"	—
White and Colored Tabulating Cards	2.25	"	—
Ground Wood Tabulating Cards	1.35	"	—
White Blank News	1.65	"	—
No. 1 Assorted Old Kraft	1.75	"	—
No. 1 Mixed Paper	.95	"	—
Overissue News	1.10	"	—
Box Board Cuttings	.72½	"	—
New Corrugated Cuttings, Kraft	2.25	"	—
Old 100% Kraft Corrugated Containers	1.75	"	—
Old Corrugated Containers	1.40	"	—
Jute Corrugated Cuttings	1.07½	"	—

Bagging

(F. o. b. Boston)

Gunny Bagging—			
Foreign	(nominal)		
Domestic	2.75	@	2.90
Sisal Rope No. 1	*4.75	"	—
Sisal Rope No. 2	* —	"	4.00
Mixed Rope	—	"	1.55
Transmission Rope—			
Foreign	(nominal)		
Domestic	2.75	"	3.00
Manila Rope—			
Foreign	(nominal)		
Domestic	5.75	"	—
Soft Jute Rope	4.50	"	5.00
Jute Carpet Threads	3.00	"	3.50
Bleachery Burlap	8.50	"	9.00
Scrap Burlap—			
Foreign	(nominal)		
Domestic	3.00	"	3.25
South American	—	"	3.25
Wool Tares—			
Foreign	(nominal)		
Domestic	4.25	"	—
Aust. Wool Pouches	—	"	3.60
New Zealand Wool Pouches	—	"	3.30
New Burlap Cuttings	4.75	"	5.00
Heavy Baling Bagging	4.00	"	4.25
Paper Mill Bagging	2.50	"	3.00
No. 2 Roofing Bagging	1.35	"	—

* OPA Maximum Prices.

Domestic Rags (New)

(F. o. b. Boston)

Shirt Cuttings—			
New Light Prints	.04¼	@	.04½
Fancy Percales	.04¼	"	.05
New White No. 1	.06¾	"	.07
New Light Flannelettes	.05½	"	.06
Canton Flannels, Bleached	.06	"	.06½
Underwear Cuttings, Bleached	.06¾	"	.06½
Underwear Cuttings, Unbleached	.06¾	"	.06
Silesias No. 1	.06	"	.06½
New Black Silesias	.05	"	.05½
Red Cotton Cuttings	.03½	"	.04
Soft Unbleached	.06½	"	.06½
Blue Cheviots	.05¼	"	.05
Fancy	.03¾	"	—
Washable	.02¾	"	—
Khaki Cuttings	.02¾	"	.03
O. D. Khaki	.03½	"	.03½
Corduroy	.03½	"	.03½
New Canvas	.06½	"	.06½
B. V. D. Cuttings	.06¾	"	.06½

Domestic Rags (Old)

(F. o. b. Boston)

White No. 1—Repacked	1.80	@	1.90
Miscellaneous	1.20	"	1.30
White No. 2—Miscellaneous	2.65	"	2.70
Twos and Blues, Repacked	2.20	"	2.30
Old Blue Overalls	2.25	"	2.30
Thirds and Blues, Repacked	2.20	"	2.30
Miscellaneous	1.80	"	1.90
Black Stockings	3.50	"	4.00
Roofing Stock—			
No. 1	1.55	"	1.60
No. 2	1.45	"	1.50
No. 3	1.35	"	1.40
No. 4	1.35	"	1.40
No. 5, Quality A	1.35	"	1.40
Quality B	1.30	"	1.35
Quality C	.95	"	1.00
Old Manila Rope	5.75	"	6.00

* OPA Maximum Prices.

Foreign Rags

(F. o. b. Boston)

Canvas	(nominal)
Dark Cottons	(nominal)
Dutch Blues	(nominal)
New Checks and Blues	(nominal)
Old Fustians	(nominal)
Old Linsey Garments	(nominal)
New Silesias	(nominal)

CHICAGO

Waste Paper

(F. o. b. Chicago)

OPA Maximum Prices, Baled

Shavings—			
No. 1 Hard White Envelope Cuts, one cut	3.37½	@	—
No. 1 Hard White Shavings, unruled	2.87½	"	—
No. 1 Soft White Shavings	2.50	"	—
No. 1 White Ledger	2.30	"	—
No. 1 Heavy Books & Magazines	1.92½	"	—
White Blank News	1.65	"	—
Mixed Kraft Env. & Bag Cuttings	2.75	"	—
No. 1 Assorted Old Kraft	1.75	"	—
Overissue News	1.10	"	—
No. 1 News	1.00	"	—
No. 1 Mixed Paper	.95	"	—
No. 1 Roofing Rags	1.55	"	—
No. 1 Roofing Bags	1.45	"	—

Which slitter offers 50 to 100 percent increased output over earlier types of slitters and rollwinders, when handling gummed tape, waxed paper, glassine?
CAMACHINE 10-6 CERTAINLY!!!

CAMERON MACHINE COMPANY
61 Poplar Street, Brooklyn 2, N. Y.
Midwest Office: Harris Trust Building 111 W. Monroe Street, Chicago 3

West Virginia Pulp and Paper Company

230 Park Ave. New York
35 East Wacker Drive Chicago
Public Ledger Building Philadelphia, Pa.
503 Market St. San Francisco, Cal.

Manufacturers of

ENGLISH FINISH BOOK
SUPERCALENDERED BOOK and LITHOGRAPHIC PAPERS

Offset, Envelope, Bond, Writing, Mimeograph, Ledger, Eggshell, Cover and Music Papers, Index Bristol, Post Card and Label Papers, Machine Coated

HIGH GRADE COATED BOOK

• • • •

KRAFT WRAPPING AND KRAFT ENVELOPE
KRAFT LINER BOARD
BLEACHED SULPHITE AND SODA PULP
BLEACHED AND UNBLEACHED KRAFT PULP

MILLS:
Mechanicville, New York
Luke, Maryland
Covington, Virginia
Tyrone, Pennsylvania
Williamsburg, Pennsylvania
Charleston, South Carolina

We Are Looking for Trouble

Often little things mean more work for the machine hand, the superintendent, or the purchasing agent. Does some little thing give trouble on your screens? Write us about it! Or ask to have a *UNION* representative call!

We may be able to help and we'd sure be glad to try.

UNION SCREEN PLATE COMPANY
FITCHBURG, MASS.
(ASSOCIATED WITH UNION MACHINE CO.)

SCREENS for PAPER and PULP MILLS

PERFORMANCE of your Centrifugals Shakers and Drainers definitely improved by the use of precision screens built to your specifications. Let us "sit in" on your screening problems.

The Harrington & King PERFORATING CO.

5652 Fillmore St., Chicago 44, Ill.—114 Liberty St., New York 6, N. Y.

HELP WANTED

WANTED
ENGINEERING DRAFTSMEN

For design and development of insulation board mill equipment and allied machinery. Permanent position. Experience in design of paper mill equipment helpful but not required. Location South. State availability with complete details of experience.

Address Box 45-726 care Paper Trade Journal. J-3

SALARIED POSITIONS

$5,500-$25,000. Recoservice is creating lifetime opportunities now. This thoroughly organized confidential service of 35 years' recognized standing and reputation carries on preliminary negotiations for supervisory, technical and executive positions of the calibre indicated. Retaining fee protected by refund provision. Identity covered and present position protected. Send only name and address for details.

R. W. BIXBY, INC.
117 Delward Bldg., Buffalo 2, N. Y. TF

CHEMIST

Technical Control Chemist for board mill producing regular and special grades of fibre board. One capable of establishing and interested in maintaining technical control of stock preparation, hard sizing and new developments. A chemist having some years of experience preferred. Splendid opportunity for right man with growing company. If interested and feel can qualify, give complete information in first letter.

Address Box 45-838 care Paper Trade Journal. J-3

WANTED

Art director: Company long established in paper converting requires executive to enlarge and direct present art department. Creative Talent, ingenuity and organizational ability basic requirements. Send qualifications in detail stating experience in printing, nature of positions held and type of creative work done. Salary according to ability.

Address Box 45-836 care Paper Trade Journal. D-27

WANTED—Either one or two experienced machine tenders familiar with cylinder machines making .009 corrugated .030 liners to .040 chip board. Mill located in Caracas, Venezuela. Transportation from the States and back furnished. Contracts must be for at least a year. State experience and salary desired. Address Box 45-813 care Paper Trade Journal. D-27

SALESMAN—Experienced folding cartons and specialties calling on large manufacturers and wholesale jobbers. Unusual opportunity in protected territory. In reply give resume of experience and personal status. Replies confidential. Address Box 45-818 care Paper Trade Journal. J-3

WANTED—One machine tender and one back tender by a Pennsylvania Fourdrinier Kraft Mill. Steady work with no postwar problems. This mill is not dependent on open market paper sales, as entire production is absorbed by parent company. Address Box 45-819 care Paper Trade Journal. D-27

WANTED—Man experienced in operation of duplex cutter and folder on tissues and general finishing room ability by New York State Mill. Right man can begin as foreman or work into that position quickly. State age, experience and references. Address Box 45-835 care Paper Trade Journal. D-27

PAPER TRANSPARENTIZER—Technical man experienced in transparentizing paper. Ability to work with research chemists and design or assist in the design of equipment for transparentizing paper. Experience more important than age. Give complete information in first letter, including salary requirements. All answers held confidential. Address Box 45-825 care Paper Trade Journal. T.F.

SALES ENGINEER with knowledge of Pulp and Paper Machinery and experience in merchandising. Write giving background, references and salary expected. Address Box 45-606 care Paper Trade Journal. TF

HELP WANTED

CHARLES P. RAYMOND SERVICE, Inc.
294 Washington St., Boston, Mass.
Specializing in Paper Mill Personnel
Positions Now Open

Staff instrument man with chemical or mechanical or industrial engineering degree and several years' practical experience; salary $400-500 month
Molded products manufacturer or foreman
Payroll clerk (New England)
Mechanical engineer (graduate) to develop into board superintendent
Coating mill superintendent or technical director
Mechanics to grind rubber rolls; machinist as scale repair man
Young mechanical engineer for firm building paper mill apparatus
Board mill and kraft mill superintendents for Canada
Senior staff engineer with paper mill experience in time studies, job analysis, etc., salary $500-550 month
Master mechanic, plant and power engineers, $4,000-8,000 year, also designers and draftsmen

We invite correspondence (strictly confidential) with employers seeking personnel and men seeking new positions. D-27

WANTED — GROUNDWOOD SUPERINTENDENT—Man experienced in all phases of groundwood production to help install and operate new mill in south. In reply give age, details of experience, including types of groundwood produced, salary, availability, etc. Address Box 45-850 care Paper Trade Journal. D-27

CLASSIFIED ADVERTISING

HELP WANTED—5c a word. Double rate for heavy face type. Minimum charge $1.25.

SITUATIONS WANTED—5c a word, double rate for heavy face type. Minimum charge $1.25. If repeated ½ rate will be charged for each consecutive repetition.

FOR SALE—5c a word. Double rate for heavy face type. Minimum charge $1.25.

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OPPORTUNITIES—5c a word. Double rate for heavy face type. Minimum charge $1.25.

Classified advertising space may also be purchased at $3.00 per single column inch.

All classified advertisements are payable in advance.

If box number is used—35 cents additional.

Address Replies
to advertisements appearing under Box Numbers in care of
PAPER TRADE JOURNAL
15 West 47th Street
New York 19, N. Y.

HELP WANTED

Superintendent of Maintenance with paper mill experience, knowledge of power and electricity. Give full information including experience and age.

Address Box 45-851 care Paper Trade Journal. J-10

WANTED — ENGINEERS — Capable of handling general engineering work in established consulting engineers office specializing in pulp and paper mills. Address Box 45-469 care Paper Trade Journal. TF

WANTED—Night Boss for medium sized Board Mill in New York area. Must be good paper maker and successful leader of men. Address Box 45-784 care Paper Trade Journal. D-27

MAN thoroughly acquainted with color formulation and coating, competent to take charge of installation and operation of extensive machine coating development. Fully state past experience and education. Exceptional opportunity. Address Box 45-833 care Paper Trade Journal. D-27

WANTED—Mechanical Engineer Pacific Coast Sulphate pulp and paper company. Permanent position. High salary for the right man. Please give full particulars in first letter. Address Box 45-841 care Paper Trade Journal. J-10

WANTED—By Eastern Mill, technically trained man to operate groundwood mill. State details of education, age, experience and salary expected. Address Box 45-843 care Paper Trade Journal. J-17

WANTED—By Board Mill—Chemical engineering or chemistry graduate to take charge of mill control and research. Give details of education, age, experience, salary expected. Address Box 45-844 care Paper Trade Journal. J-17

WANTED — Young mechanical engineering graduate for Paper Mill to do drafting and design. State age, experience, education and salary expected. Address Box 45-845 care Paper Trade Journal. J-17

TOUR BOSS WANTED to be trained for job as assistant Superintendent of Roofing Felt Mill located in New Orleans. Send complete resume giving experience. Address Box 45-847 care Paper Trade Journal. J-17

WANTED—Night Superintendent for Cylinder Machine mill making groundwood and sulphite specialties. Furnish complete information about yourself, your experience and the salary expected. Foster Paper Company, Utica, New York. D-27

CHEMIST—New York City location. Young man, preferably with training and some experience in paper making for laboratory and development work in semi chemical pulping. Send complete information first letter. Address Box 45-848 care Paper Trade Journal. J-10

WANTED—Master Mechanic two machine mill, long established. Should be familiar with modern steam boiler and control equipment, also modern electric installations, as well as knowledge of paper mill maintenance. Address Box 45-852 care Paper Trade Journal. J-3

SITUATIONS WANTED

PUMP—Application engineer seeks change of employment. Familiar with sales and selections of all types of pump applications for pulp and paper mills. Excellent record with a leading company in this field for over 10 years. Address Box 45-837 care Paper Trade Journal. J-17

EXECUTIVE TECHNICAL DIRECTOR AVAILABLE—Now employed. Desires change to more progressive organization. Prefer position as Superintendent or assistant superintendent. Would consider Technical Director, Member of Tappi, 14 years diversified experience in manufacture of soda, sulphate pulp and fine papers. Address Box 45-826 care Paper Trade Journal. D-27

BUILT ON YOUR DESK—and custom built at that!

It's a fact that paper machines are custom built to the 'nth degree, because into each machine must go the experience of many men modified to meet the new conditions. Their will—working on the materials of memory; not satisfied with following the order prescribed by precedent or suggested by accident, but selecting the parts of different conceptions, or objects of memory, to form a *new* machine, more pleasing and decidedly more efficient.

Thus it is that no existing machine will entirely meet *your* requirements. Thus it is that Black-Clawson engineers are eager to sit across your desk and step by step aid in planning your new machine. You owe it to yourself to consult their memory and logic. No machine too small; no machine too large—to warrant their presence.

And when the design has been decided upon—Black-Clawson has the facilities to bring it into tangible form.

THE BLACK-CLAWSON CO., Hamilton, Ohio

Divisions: **Shartle Brothers Machine Co., Middletown, Ohio; Dilts Machine Works, Fulton, N. Y.**

Associate: **Alexander Fleck Limited, Ottawa, Canada**

SITUATIONS WANTED

ACCOUNTANT—Expert Paper and Pulp Mill Costs, thorough knowledge paper mill practice gained through twenty years in the industry, desires connection where initiative and ability will be recognized. Address Box 45-748 care Paper Trade Journal.. J-10

TOUR BOSS on high grade bonds and ledgers, also specialties. Expert on colors. In this position eleven years with one of the finest mills in America. Seeks exacting assignment. Address Box 45-811 care Paper Trade Journal. D-27

ENGINEERING GRADUATE—10 years experience as Chemist and Assistant to Mill Superintendent in mill making Sulphite Bond and Ledger. Desires position as Superintendent, Asst. Superintendent or Technical Director in medium size Paper Mill. Address Box 45-831 care Paper Trade Journal. J-3

EXECUTIVE—At present of national folding carton manufacturer. Interested in connection with smaller manufacturer seeking young man with extensive experience to manage and expand sales. Replies confidential. Address Box 45-786 care Paper Trade Journal. F-28

FOR SALE

REVAMPING AND BUILDING MILL AND CAN OFFER FOR SALE

One large Breaker Beater complete
One small Beater Complete
1—30" Diameter X 90" Face cylinder mold
1—8x8 Shartle Duplex plunger stock pump
1—New pair cast steel double suspension spring type beater bearings for 8" diameter journal—Noble & Wood beater roll. Never used
1—Used old style lighter beam for 8" diameter journal Noble & Wood beater
1—New reinforced design lighter beam for 8" diameter journal—Noble & Wood beater roll. Pattern No. 663. Never used.
3—300 KVA —33000-2300/4000 volts transformers
80—52" Face steel dryer felt rolls—1—7/16" journals
1—30" Face cast iron taper pulley—2 15/16" bore taper 31"x29½"
4—36" diameter x 83" face dryers
1—8" to 10" Cox & Sons Pipe threading machine
1—40" Noble & Wood impeller for circulation stock in beater.

A visit to the mill would prove profitable as we have many items for sale to numerous to mention. See our superintendent Mr. O. P. Fussell at our plant in Walloomsac, New York.

WALLOOMSAC PAPER MILLS, INC.
Mills: Walloomsac, New York
Main Office: 25 Vanderbilt Avenue
New York 17, New York TF

FOR SALE

Four cylinder machine
Molds 90" face
1 Beloit suction drum roll
1 pair squeeze rolls
2 main presses
36 dryers
3 calender stacks
2-spool reel
Slitter
White water pumps
new drives

SHARTLE BROS. MACHINE CO.
Middletown, Ohio D-27

FOR SALE—1 Hamilton-Corliss Variable Speed Twin Engine, size of cylinders 12" x 24" Also Triple-Deck Frames for ninety 36" dryers any width. The Chesapeake Paperboard Co. Baltimore, 30, Md. TF

PAPER COATING MACHINERY — Waxing, Oiling, Gumming, Gluing, Carbon, Laboratory Coating and Treating Machines. High speed. New improvement. MAYER MACHINE COMPANY, Inc., 1155 Scottsville Road, Rochester, 11, N. Y. TF

FOR SALE—5 new Drycor Wet Machine Felts, 41'9" x 60". Waterford Pulp and Paper Corp., Quaker Hill, Conn. J-3

FOR SALE—Langston Spiral Tube and Cap Machine.—Complete paper can equipment. Address Box 45-849 care Paper Trade Journal. J-3

FOR SALE

FOR SALE

1—Valley Iron screw press.
1—#2 Miami Jordan.
1—#9 Emerson Jordan for direct connection to a motor, requires use of 400 H.P. motor.
1—Shartle Bros. Triplex 8 x 18.
1—2000 lb. Holyoke Beater.
1—1000 lb. Dayton Beater.
1—Jones pulper.
3—12 Plate Murray Dunbar Flat Screens.
1—18 Plate Flat Screen with scraper.
1—IMPCO centrifugal Pulp Screen Design No. 3.
13—Driers 60" x 154".
23—Driers 36" x 82".
1—Buffalo Pump—5500 g. p. m., direct connected to 100 H.P. Motor (50' head).
3—Worthington turbine well pumps, 300 g.p.m.—for 14' and 16'—with motor.
1—45" Laminating Machine.
1—Roots-Connersville Vacuum Pump.
1—42" Johnstone Slitter and Winder.
1—60" Hudson Sharp 2 shaft slitter and winder.
1—72" Kidder two drum slitter and winder.
1—116" Moore & White slitter and winder. 4 Drum.
1—60" Moore & White slitter and winder set for 5/8" slits.
1—60" Moore & White slitter and winder set for 7/16" slits.
1—40" Brown Carver trimmer.
2—84" Appleton single press wet machines.

Various sizes of Centrifugal Pumps. Write us regarding your particular requirements.

We are always in the market to purchase your surplus or idle machinery. What have you to offer?

J. J. ROSS COMPANY
250 Frelinghuysen Ave.
Newark 5, N. J.
Bigelow 3-3720 D-27

GOOD EQUIPMENT FOR SALE

34" and 40" Slitters.
41" Hamblet Sheeter.
80" and 110" Mill Type Sheeters.
48" Brown & Carver Auto. Power Cutter.
63" Oswego Hand Clamp Cutter.
62" Two-roll Back-stand, new.
36" Waldron Paper Reel.
30" Waldron 7-color Wall Paper Printing Press.
68" Rice, Barton & Fales Slitter-Rewinder, for use on dry end of paper machine.
14 x 22 John Thomson.
Balers—New—both hand and power.

THOMAS W. HALL COMPANY, Inc.
120 West 42nd St., New York 18, N. Y. TF

FOR SALE

7—cylinder molds, hollow shaft 36 x 104, with iron end vats and bearings.
1—vat for 42" x 104" mold.

SHARTLE BROS. MACHINE CO.
Middletown, Ohio D-27

FOR SALE

One new and one used Horse Patent type, wood tub beaters, 1500# capacity. Roll 60" face, 8" dia., Washer 40" dia., 32" face, Texrope Drive. Beater Pulley, 60" dia., Motor Pulley 14" dia. for 10 "D" Section V Belts. With or without 100 HP, 440 Volt, 3 phase 60 cycle, 514 RPM, Exciter Volts 230. Burke Syn. motors and Cutler-Hammer Controllers.

DUNN SULPHITE PAPER CO.
Port Huron, Michigan D-27

FOR SALE

FOR SALE

78" LANGSTON CUT-OFF KNIFE
36", 44", 48" PAPER POWER CUTTERS
66" x 46" SHERIDAN 4-POST DIE CUTTER
1 & 2 COLOR MEISEL ROTARY PRINTERS
12" x 16" KIDDER 2-COLOR ROTARY PRINTER
15" x 18" SEYBOLD 4-POST EMBOSSER
56", 50", 46" MIEHLE PRINTERS
50" WALDRON 6-ROLL POLISHER COATER
64" WALDRON DRUM REWINDER
52" DOUBLE SIDED COATER & SPREADER

ALSO SLITTERS & REWINDERS, CREASERS, SCORERS, TRIMMERS, GLUERS, STITCHERS, CORNER CUTTERS AND NUMEROUS PAPER & BOARD CONVERTING MACHINERY. WRITE FOR BULLETINS, LISTING OVER 100 MACHINES, NOW AVAILABLE.

SOUTH WABASH ENGINEERING CO.
2937 South Wabash Ave., Chicago 16, Ill. J-24

1—E. D. Jones Imperial Jordan with 5/16" solid steel fillings and extra new plug filling directly coupled to 150 hp G.E. AC motor. Capacity 60 tnns 24 hours. A-1 condition.
1—84" Hamblet late type ball bearing single rotary sheet cutter with slitting attachment, 8 double deck roll backstand, Hamblet layboy with 4 partitions and 6 HP G.E. A.C. motor equipment. All perfect condition.
2—Clark Rotary Sheet Cutters, one 60" wide with 24 roll backstands and motor and one 84" wide without motor or backstands.
1—42" Shear Cut Slitter and Rewinder manufactured by Brener Co. of Strausberg, France. Good little machine.
1—96" Bagley & Sewall 2-bowl upright Paper Machine Reel.
1—60" wide paper creping machine.
3—Rotary Digesters or Rag Cookers, complete with drives, size 6'x20'.
1—76" Smith & Winchester Undercut Power Paper Cutter complete with suitable motor equipment. Rebuilt and guaranteed.

Complete line of Self-Opening Bag Machines making from 1/2 to 25 lbs. inclusive.

GIBBS-BROWER COMPANY, INC.
21 East 40th St., New York 16, N. Y. TF

FOR SALE

1—54" 6-roll super calender stack with three extra paper filled rolls.
1—80" super calender, 7 rolls, with G.E. motor variable speed, 3 phase, 60 cycle, 220 volt, hydraulic pump and accumulator.

SHARTLE BROS. MACHINE CO.
Middletown, Ohio D-27

FOR SALE

1—52" Model 44" new Cameron rewinder, drums 6¼" dia. Winds 36" dia. rolls. No slitter part with this model.
1—Standard thirty ft. pulp conveyor, portable type.
1—86" Warren two drum winder.
1—90" two bowl Beloit reel.
1—Log conveyor, steel supports.
1—72" Hamblet Cutter.
2—64" Hamblet cutters, with piler and backstand.
3—Variable speed motors, 17.5 HP, 550 volt, 3 phase, 60 cycle, 1650 RPM with remote controls.
1—300 HP Terry reduction unit.
1—800 lb. Holyoke Iron Works beater roll 48 x 44".
1—2000 lb. Horne patent beater, bronze bars, 4" tub.

FRANK H. DAVIS CO.
175 Richdale Ave., Cambridge, Mass. J-3

ROSS PAPER MACHINERY CO.

265 PASSAIC STREET

NEWARK 4, N. J.

TELEPHONE
HUMBOLDT 2-2177

CABLE ADDRESS: JACK ROSS

NEW, USED, REBUILT
PAPER AND PULP MACHINERY

CONVERTING
PAPER MAKING EQUIPMENT

BEATERS
1—2500 lb. Downingtown Iron Tub.
2—1000 lb. Horne Iron Tub.
1—1200 lb. Holyoke Wood Tub.
1—2000 lb. E. D. Jones Iron Tub Beater, with washer-rebuilt.
1—1500 No. Midwest Iron Tub Beater.

CALENDER DOCTORS
1 set of 16 Warren Doctors 104" face with frames.
1 set of 8 Warren Doctors 88" face with frames.

CALENDER STACKS
1—6 roll Beloit, 110" face.
1—11 roll Pusey & Jones, 104" face.
1—9 roll Rice Barton 99" face.
1—3 roll Moore & White 86" face.
2—2 roll Holyoke 36" face.
2—9 roll Moore & White—82" face.

CONVERTING EQUIPMENT
1—Hudson Sharp 63" Slitters and Folding Machines for converting facial tissue. With motors and starters.
4—Sanitary Napkin Machines. With motors and starters. Capacity 105 pads per minute each.
1—Bliss Double Head Stitcher.
1—Boston Single Head Stitcher.
1—Bliss Box Assembling Machine.
4—Waterville Grinders.
1—36" Waldron Reeling Machine.
1—39" Dampening Machine.
1—36" Brush Coating Machine.
1—Copper Mixing Tank with agitator—40 gal.
1—Cast Iron Kettle 20" x 24" 2 outlets.

CONVEYORS
1—450' 36" wide rubber assorting conveyor.
1—Standard Conveyor 30' long on wheels for handling bales of pulp. Direct connected to 5 h.p. motor.

DRYERS
1—48" diameter x 89" face.
4—60" diameter x 174" face framed and geared.
1—36" diameter x 102" face with bearings.
18—36" diam. 82" face 2 deck frames.
40—28" diam. 96" face 2 deck frames.

EXTRACTOR ROLLS
1—Downingtown 24" diameter, 135" face, with rubber couch 18" diameter.

FESTOON DRYERS
100" Proctor & Schwartz
60" Proctor & Schwartz

FLAT SCREENS
1—Moore & White 8 Plate.
1—Moore & White 10 Plate.
1—Sandy Hill Packer 10 Plate.
9—Sandy Hill Packer 12 plate screens.
1—Trimbey Pulp Screen 30 ton cap.

FOURDRINIER WET END
1—120" Beloit Fourdrinier Wet End complete.

HEADING MACHINE
1—W&W Heading Machine—electric heated head.

JORDANS
1—Dillon No. 2 Motor drive.
1—Appleton No. 2 motor drive.
1—No. 2 Emerson with spare steel plugs.
1—Noble & Wood Monarch Pony Jordan.

KNIFE GRINDER
1—72" Seybold automatic used on year.

LATHE
1—Sidney Machine & Tool Co. quick change. 10' centers, 24" swing; 2 chucks; and Face Plate.

MISCELLANEOUS
500—Cameron slightly used Slitter Knives—$1.00 each. Purchased from a war cancellation.
2—Yankee Dryer doctor oscillators (Beloit)

MISCELLANEOUS
2—Nugent Oil Filters (new).
2—Beloit Fourdrinier Shakes.
2—Rotary Dusters with blowers.

MOTORS
4—1000 h.p. motors, 2300 volts with all controls.
1—30 h.p. 600 R.P.M. 2300 V. 3 Ph. 60 cy.
1—40 h.p. 3600 R.P.M. 2300 V. 3 Ph. 60 cy.

PLATERS
2—Holyoke 2 Roll 18" dia. 36" face.

PULLEYS
185—Cone Lift and Solid Cast Iron Pulleys. Various Sizes.

PULP EQUIPMENT
Complete Ground Wood Mill—
4—Sandy Hill four pocket Grinders. Each direct connected to 1000 h.p. motor, 2300 volts, 27" stones. Spare stones, etc. Excellent condition. Will sell all or part.
2—Pusey & Jones vertical Digesters (welded) 7' dia., 24' high 125 lb. pressure.
8—Horizontal Digesters 15' diam, 47' face 150 lb. pressure.
3—Improved No. 2 Knotters.
1—Nicholas-Herreshoff Lime Kiln.
1—Williams No. 30 Bark Hog.
1—36" Bauer Bros. Single Revolving Disc Mill. Direct connected to 50 h.p. motor, 3 phase, 60 cycles, 220 volts, 1160 r.p.m.
1—Carthage 4 pocket 27" grinder. Ball bearing equipment
1—126" face Kamyr Press.

PULPERS
1—Sturtevant Bale Pulper with conveyor & motors used three years.
1—Voith Pulper 20 tons cap.

PUMPS
1—Frederick 400 g.p.m.—60' head.
1—Pusey & Jones 8" x 8" Stock.
1—DeLaval 6" x 6".
1—Oliziti Acid 3" Suction.
1—Midwest 6" stock pump.
1—Frederick 550 g.p.m. 132' head.

REELS
2—Pusey & Jones 104" face 18" dia. bowls.
1—Pusey & Jones 115" face 18" dia. bowls.
1—2-bowl 100" face 20" dia. bowls.

REFINERS
1—10" Wiener Refiner with Regulating Valves.
2—#1 Claflin Refiners. Bronze construction.

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1—Cleveland 2 H. P.—10 to 1 ratio.
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1—Lobdell Roll Grinder. Will take roll 24" diamstar x 160" face.
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1—Guyton-Cumfer 5 gates.

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1—Shartle Cylinder Mold 72" face, 36" dia. with 16" dia. couch.
1—A. D. Wood cylinder 48" dia. 60" face.
1—Dorr Company No. 40 ADKA Saveall 340-440 GPM. Used 1 month.
1—Dorr Company No. 50 ADKA Saveall 550—600 GPM. Used 1 month.

SCREW PRESS
1—Valley Iron Screw Press. Used 2 years.

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1—80" Hamblet Single Knife Sheeter with Moore & White layboy; 4 roll backstand.

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1—88" face, two drum Warren Slitter and Winder.
1—116" 2 drum Pusey & Jones slitter & winder.
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1—12" x 16" Shartle triplex.
1—12 x 12 Gaulds Triplex.
1—7" x 16" Shartle triplex.

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1—7 roll Holyoke 72" face: 3 paper and 3 iron rolls. 1 new spare paper roll.
1—7 roll Holyoke 52" face: 3 paper and 4 iron rolls. 1 new spare paper roll.

THICKENERS
7—IMPCO Washers. Cylinder molds 54" face x 40" diameter with 16" diameter rubber couches and whippers.
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1—39" Eureka Hand Operated.

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1—36 Spindle Brownell Twister with motor.

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Shartle Brothers Machine Co.
Valley Iron Works
Waldron Corp., John
Westinghouse Electric Corporation
T. B. Wood's Sons Company

CRANES
Northwest Engrg. Co.

CUTTERS
Dilts Machine Works
Thomas W. Hall Co.
Noble & Wood Mach. Co.
Perkins & Son, Inc., B. F.
The Smith & Winchester Mfg. Co.
Taylor Stiles & Co.

DAMPENERS
Perkins & Son, Inc., B. F.
Valley Iron Works Co.

DE-INKING
Dilts Machine Works
Kinsley Chemical Co.
Shartle Bros. Mch. Co.

DIGESTERS
Biggs Boiler Works Co.
H. K. Porter Company Inc.
Pusey & Jones Corp.

DOCTORS
Bird Machine Company
Black-Clawson Company
Downingtown Mfg. Co.
Lobdell Co.
Montague Machine Co.
The Sandy Hill Iron & Brass Works
Shartle Brothers Machine Co.

DOCTOR BLADES
Black-Clawson Company
The Manhattan Rubber Mfg. Division of Raybestos-Manhattan, Inc.
Montague Machine Co.
Rotogravure Engrg. Co.
The Sandy Hill Iron & Brass Works
Shartle Brothers
United States Rubber Co.
Westinghouse Electric Corporation

DRIERS
Black-Clawson Company
Murray Mfg. Co., D. J.
J. J. Ross Company
Ross, J. O. Engineering Corp.
Rotogravure Engrg. Co.
The Sandy Hill Iron & Brass Works
Shartle Brothers Machine Co.
Valley Iron Works Co.

DRIVES
Allis-Chalmers Mfg. Co.
Appleton Machine Co.
Bird Machine Co.
Black-Clawson Company
Davis, Frank H., Co.
De Laval Steam Turbine Co.
Dilts Machine Works
Downingtown Mfg. Co.
Farrel-Birmingham Co.
General Electric Company
Horton Manufacturing Co.
Rodney Hunt Machine Co.
Montague Machine Co.
Moore & White Co.
Murray, D. J. Mfg. Co.
Noble & Wood Machine Co.
Pusey & Jones Corp.
J. J. Ross Company
The Sandy Hill Iron & Brass Works
Shartle Brothers Machine Co.
T. B. Wood's Sons Co.
Valley Iron Works Co.
Westinghouse Electric Corporation

DUSTERS
Appleton Machine Co.
Downingtown Mfg. Co.
Fibre Making Processes, Inc.
E. D. Jones & Son Co.
Moore & White Co.
Noble & Wood Machine Co.
Norwood Engrg. Co.
D. J. Murray Mfg. Co.

DYESTUFFS
Calco Chemical Co.
Ciba Company
E. I. du Pont de Nemours & Co.
Geigy Co., The
General Dyestuff Corp.
National Aniline Division, Allied Chemical & Dye Corp.
Paper Makers Chemical Department, Hercules Powder Co.
C. K. Williams & Co.
Witco Chemical Co.

EQUIPMENT INSTALLATION
Merritt-Chapman & Scott Corp.

EVAPORATORS
Black-Clawson Company
Goslin-Birmingham Mfg. Co., Inc.
Murray, D. J., Mfg. Co.
Swenson Evaporator Co., Div. of Whiting Corp.

FANS
General Electric Co.
B. F. Perkins & Son, Inc.
Ross Engineering Co., J. O.

FEEDERS
Builders-Providence, Inc.
Merrick Scale Mfg. Co.
Leeds & Northrup
Wallace & Tiernan

FELTS
Appleton Woolen Mills
Asten-Hill Mfg. Co.
Bloomfield Woolen Co.
Bulkley, Dunton Pulp Co. Inc.
Draper Bros. Corp.
Huyck & Son, F. C.
Lockport Felt Co.
Mt. Vernon-Woodbury Mills, Inc.
Morey Paper Mill Supply Co.
Orr Felt & Blanket Co.
Shuler & Benninghoven
Waterbury Felt Co.
Woodward, Baldwin & Co.

FELT GUIDES
Moore & White Co.
The Sandy Hill Iron & Brass Works
Shartle Brothers Machine Co.
Waldron Corp., John

FILLERS
American Colloid Co.
Amer. Cyanamid & Chem. Corp.
American Resinous Chemicals Corp.
Johns-Manville Sales Corp.
W. H. Loomis Talc Corp.
Vanderbilt Co., R. T.
Witco Chemical Co.

FILTERS
Moore & White Co.
J. O. Ross Engrg. Corp.
Worthington Pump & Machy. Corp.
Witco Chemical Co.

FLOORING, GRATING & TREADS
Hendrick Mfg. Co.
Norton Co.
Manhattan Rubber Mfg. Div. of Raybestos-Manhattan, Inc.
United States Rubber Co.

FORMING MACHINES
Downingtown Mfg. Co.
Noble & Wood Machine Co.
Oliver United Filters
The Sandy Hill Iron & Brass Works
Shartle Brothers Machine Co.

FRICTION MATERIALS
Johns-Manville Sales Corp.

GEARS
Black-Clawson Company

WHERE TO BUY

De Laval Steam Turbine Co.
Downingtown Mfg. Co.
Farrel-Birmingham Co.
E. D. Jones & Sons Co.
Moore & White Co.
D. J. Murray Mfg. Co.
The Sandy Hill Iron & Brass Works
Shartle Brothers Machine Co.
Smith & Winchester Mfg. Co.
Valley Iron Works Co.
Waldron Corp., John

GRINDERS
Farrel-Birmingham Co.
Lobdell Car Wheel Co.
Montague Machine Co.
Norton Company
Samuel C. Rogers and Company
The Sandy Hill Iron & Brass Works

GRINDING WHEELS
The Manhattan Rubber Mfg. Division of Raybestos-Manhattan, Inc.
Norton Company
Simonds Worden White Co.
United States Rubber Co.

HEATING, VENTILATING AND AIR CONDITIONING
The Appleton Machine Co.
Armstrong Machine Works
Fibre Making Processes, Inc.
E. D. Jones & Sons Co.
General Electric Co.
Grinnell Company
Leeds & Northrup
D. J. Murray Mfg. Co.
Noble & Wood Machine Co.
Ross Engineering Corp., J. O.
Shartle Brothers Machine Co.
Stickle Steam Specialties Co.
Valley Iron Works Co.
Worthing Pump & Mchy Corp.

HOISTS
Appleton Machine Co.
Dilts Machine Works
Rodney Hunt Machine Co.
Ingersoll-Rand Co.
E. D. Jones & Sons Co.

HOSE (Air, Water, Suction, etc.)
The Cincinnati Rubber Mfg. Co.
The Manhattan Rubber Manufacturing Division of Raybestos-Manhattan Inc.
United States Rubber Co.

HUMIDITY CONTROL
Steamaire Company

INSTRUMENTS, TESTING AND MEASURING
W. H. & L. D. Betz
N. P. Bowsher
The Bristol Company
Builders-Providence, Inc.
The Foxboro Company
General Electric
W. & L. B. Gurley
Leeds & Northrup Company
National Technical Laboratories
B. F. Perkins & Son
Taber Instrument Corp.
Taylor Instrument Cos.
Testing Machines Inc.
Wallace & Tiernan Instrument Co.

INSULATION
Johns-Manville Sales Corp.

JORDAN FILLINGS
Appleton Machine Co.
Behr Brothers Mfg. Co.
E. D. Jones & Sons Co.
Noble & Wood Machine Co.
Shartle Brothers Machine Co.
Smith & Winchester Mfg. Co.
Valley Iron Works Co.

KNIVES
Black-Clawson Company
Dilts Machine Works, Inc.
Hamblet Machine Co.
E. D. Jones & Sons Co.
Simonds Worden White Co.
Valley Iron Works Co.

LABORATORY EQUIPMENT
Appleton Machine Co.
W. H. & L. D. Betz
Dilts Machine Works
E. D. Jones & Sons Co.
Leeds & Northrup Company
National Technical Laboratories
Noble & Wood Machine Co.
Taber Instrument Co.
Taylor Instrument Companies
Testing Machines, Inc.
Valley Iron Works

LAY BOYS
Hamblet Machine Co.
Moore & White Co.
Shartle Brothers

LINTER COTTON
The Railway Supply & Mfg. Co.

LUBRICANTS
Gulf Oil Corporation
Gulf Refining Co.
Sinclair Refining Co.
Socony-Vacuum Oil Co., Inc.
Sun Oil Company
The Texas Company
Tide Water Associated Oil Co.

LUBRICATORS
Hills-McCanna Co.

MATERIAL HANDLING
Northwest Engrg. Co.

MICROMETERS & CALIPERS
Farrel-Birmingham Co.
Montague Machine Co.
Lobdell Car Wheel Co.
Testing Machines, Inc.
Walker-Goulard-Plehn Co.

MIXERS
H. K. Porter Company
Youngstown Welding & Engrg. Co.

MOISTENING EQUIPMENT
The Spray Engineering Co.

MOISTURE CONTENT CONTROL
Steamaire Company

MOTORS AND GENERATORS
Allis-Chalmers Mfg. Co.
De Laval Steam Turbine Co.
General Electric Co.
Ingersoll-Rand Co.
Reliance Electric & Engrg. Co.
Westinghouse Electric Corporation

PACKING BOXES
Johnson Corporation
Shartle Brothers Machine Co.

PACKING
Johns-Manville Sales Corp.
The Manhattan Rubber Mfg. Division of Raybestos-Manhattan, Inc.
United States Rubber Co.

PAPER MACHINES
Black-Clawson Company
Downingtown Mfg. Co.
Thomas W. Hall Co.
Moore & White Co.
Pusey & Jones
J. J. Ross Company
The Sandy Hill Iron & Brass Works
Shartle Brothers Machine Co.
Smith & Winchester

PAPER MACHINE SLICES
Black-Clawson Company
E. D. Jones & Sons Co.
Montague Machine Co.
The Sandy Hill Iron & Brass Works
Valley Iron Works Co.

PAPERMILL BUILDERS
Merritt Chapman & Scott Corp.

PAPER TUBE MACHINERY
Dietz Machine Works
Thomas W. Hall Co.
Hudson Sharp Machine Company
Langston Co., Samuel M.

PASTING MACHINES
Black-Clawson Company
Davis, Frank H., Co.
Murray, D. J., Mfg. Co.
Moore & White Co.
Potdevin Machine Co.
Shartle Brothers Machine Co.
Waldron Corp., John

PENSTOCKS, WELDED STEEL
The Biggs Boiler Wks. Co.

PERFORATED METAL
Allis-Chalmers Mfg. Co.
Harrington & King Perforating Co.
Hendrick Mfg. Co.

PIPE
Black-Clawson Company
Crane Company
Grinnell Company
Johns-Manville Sales Corp.
Shartle Brothers Machine Co.
Stowe-Woodward Inc.
Taylor Forge & Pipe Works
Walworth Company
Youngstown Welding & Engrg. Co.

PLATERS
Perkins & Son, Inc., B. F.

PLATES
Black-Clawson Company
Hendrick Mfg. Co.
J. O. Ross Engrg. Corp.
Shartle Brothers Machine Co.
Timken Roller Bearing Co.

PLUGS
Black-Clawson Company
E. D. Jones & Sons Co.
The Noble & Wood Machine Co.
Shartle Brothers Machine Co.

PRESSURE VESSELS, STEEL & ALLOY
The Biggs Boiler Wks. Co.

PRESSES
Black-Clawson Company
Farrel-Birmingham Co.
Dietz Machine Wks.
Thomas W. Hall Co.
Hudson-Sharp Machine Co.
Paper Converting Machine Co., Inc.
Potdevin Machine Co.
Rotogravure Engineering Co.
Shartle Brothers
Valley Iron Works Co.
Waldron Corp., John
Weber, Homer G.

PULPS
Andersen Co., J.
Bulkley, Dunton Pulp Co., Inc.
Gottesman & Co., Inc.
Elof Hansson, Inc.
Perkins-Goodwin Co.
Price & Pierce, Ltd.
Pulp and Paper Trading Co.

PULPSTONES
Norton Company

PUMPS
Allis-Chalmers Mfg. Co.
Black-Clawson Company
Dorr Company
Downingtown Mfg. Co.
De Laval Steam Turbine Co.
Hills-McCanna Co.
Ingersoll-Rand Co.
Johnson Corp.
Moore & White Co.
Nash Engineering Co.
Noble & Wood Machine Co.
Paper Converting Mch. Co.
Quimby Pump Co., Div. of H. K. Porter Company, Inc.
J. J. Ross Company
The Sandy Hill Iron & Brass Works
Shartle Brothers Machine Co.
Smith & Winchester Mfg. Co.
Steamaire Company
Warren Steam Pump Company
Worthington Pump & Machinery Corp.

RECOVERY SYSTEMS
Bulkley, Dunton Pulp Co., Inc.
Rodney Hunt Machine Co.
Moore & White Co.
D. J. Murray Mfg. Co.
Pusey & Jones
Ross Engineering Corp, J. O.
Valley Iron Works Co.

REELS
Black-Clawson Company
Downingtown Mfg. Co.
De Laval Steam Turbine Co.
Hudson Sharp Machine Company
The Kohler System Company
Montague Machine Co.
Moore & White Co.
Paper Converting Mch. Co.
Rodney Hunt Machine Co.
Rotogravure Engrg. Co.
The Sandy Hill Iron & Brass Works
Shartle Brothers Machine Co.
The Smith & Winchester Mfg. Co.

REFINERS
Appleton Machine Co.
Bahr Brothers Mfg. Co.
Bauer Brothers Co.
Dilts Machine Works
The Hermann Manufacturing Co.
E. D. Jones & Sons Co.
Murray, D. J. Mfg. Co.
Noble & Wood Machine Co.
Sandy Hill Iron & Brass Works
Shartle Brothers Machine Co.
Sprout, Waldron & Co.
Sutherland Refiner Corp.
Valley Iron Works

REGULATORS
Allis-Chalmers Mfg. Co.
Armstrong Machine Works
Bird Machine Company
The Bristol Company
The Brown Instrument Co.
The Foxboro Company
Jones, E. D., & Sons Co.
General Electric Co.
Johnson Corp.
Leeds & Northrup Company
National Technical Laboratories
Noble & Wood Machine Co.
Shartle Brothers
Stickle Steam Specialties Co.
Taylor Instrument Companies
Wallace & Tiernan
Westinghouse Electric Corpoartion

RESINS
American Cyanamid & Chemical Corp.
American Resinous Chemicals Corp.
Glidden Corp.
The Resinous Products & Chemical Co.

ROLLS
Appleton Machine Co.
Black-Clawson Company
Downingtown Mfg. Co.
Farrel-Birmingham Co.
Improved Paper Machy. Corp.
Lobdell Co.
The Manhattan Rubber Mfg. Division of Raybestos-Manhattan, Inc.
Montague Machine Co.
D. J. Murray Mfg. Co.
Noble & Wood Machine Co.
Perkins, B. F., & Sons Co.
Pusey & Jones Corp.
Roehlen Engraving Co.
J. J. Ross Company
Rodney Hunt Machine Co.
The Sandy Hill Iron & Brass Works
Shartle Brothers Machine Co.
Sinclair Co.
Smith & Winchester Mfg. Co.
Stearns Magnetic Mfg. Co.
Stowe-Woodward Inc.
United States Ruber Co.
Valley Iron Works Co.
Waldron Corp., John

ROLL COVERS
The Cincinnati Rubber Mfg. Co.
Stowe-Woodward Inc.
Youngstown Welding & Engrg. Co.

ROLL STANDS
Cameron Machine Co.
Johnstone Eng. & Machine Co.
The Kohler System Company
Moore & White Co.
Potdevin Machine Co.
Rotogravure Engrg. Co.
Shartle Brothers Machine Co.

ROOFING MATERIALS
Johns-Manville Sales Corp.

ROTARY BOILERS
Biggs Boiler Works

SATURATING MACHINES
Black-Clawson Company
Moore & White Co.
Noble & Wood Machine Co.
Potdevin Machine Co.
Rotogravure Engrg. Co.
Shartle Brothers Machine Co.
Waldron Corp., John
Weber, Herman C.

SCALES
Builders-Providence, Inc.
Merrick Scale Mfg. Co.

Screen Plates
Fitchburg Screen Plate Co.
Magnus Metal Corp.
Morey Paper Mill Supply Co.
Testing Machines, Inc.
Union Machine Co.
Union Screen Plate Co.

SCREENS
Allis-Chalmers Mfg. Co.
Appleton Wire Works
Appleton Machine Company
Bird Machine Company
Carthage Machine Co.
Dilts Machine Works, Inc.
Downingtown Mfg. Co.
Harrington & King Perforating Co.
Hendrick Manufacturing Co.
E. D. Jones & Sons Co.
Montague Machine Co.
Moore & White Co.
D. J. Murray Mfg. Co.
J. J. Ross Company
The Sandy Hill Iron & Brass Works
Shartle Brothers Machine Co.
Valley Iron Works Co.

SHEET MACHINES
Thomas W. Hall Co.
The Hermann Manufacturing Co.
Noble & Wood Machine Co.
Rotogravure Engrg. Co.
Valley Iron Works Co.

SHOWER PIPES
Bird Machine Company
A. E. Broughton & Co.
Downingtown Mfg. Co.
Improved Paper Machy. Corp.
Moore & White Co.
Shartle Bros. Mach. Co.
Smith & Winchester Mfg. Co.

SHREDDERS
Bauer Brothers Co.
Carthage Machine Co.

SIZING
American Cyanamid & Chemical Co.
American Resinous Chemicals Corp.
Black-Clawson Company
The Dow Chemical Company
du Pont, E. I., de Nemours & Co.
Glidden Company, Soya Products Div.
National Oil Products Co.
Paper Makers Chemical Department, Hercules Powder Co.
Philadelphia Quartz Co.
Pioneer Salt Company
Socony-Vacuum Co.
Stein, Hall & Co., Inc.

SLITTERS
Black-Clawson Company
Cameron Machine Co.
Carthage Machine Co.
Dietz Machine Works
Downingtown Mfg. Co.
Thomas W. Hall Co., Inc.
Hamblet Machine Co.
Hudson Sharp Machine Company
Langston Co., Samuel M.
Moore & White Co.
D. J. Murray Mfg. Co.
Potdevin Machine Co.
Rotogravure Engrg. Co.
J. J. Ross Company
The Sandy Hill Iron & Brass Works
Smith & Winchester Mfg. Co.
Valley Iron Works Co.
Waldron Corp., John

SMOKE STACKS
The Biggs Boiler Wks. Co.

SOLENOID VALVES
Steamaire Company

WHERE TO BUY

SPRAYING EQUIPMENT
Seamaire Company
The Spray Engineering Co.

STAINLESS STEEL
Allegheny Ludlum Steel Co.
The Condon & Carpenter Co.
Eastern Stainless Steel Corp.
Industrial Steels, Inc.

STARCH
American Cyanamid & Chemical Corp.
Clinton Co.
National Starch Products, Inc.
Stein, Hall & Co., Inc.

STEAM SPECIALTIES
Johnson Corp.
Shartle Bros. Mch. Co.
Stickle Steam Specialties Co.

STEEL TANKS
The Biggs Boiler Wks. Co.

STRAPPING & STRAPPING MACHINES
Acme Steel Company
The Stanley Works

STUFF CHESTS
Downingtown Mfg. Co.
E. D. Jones & Sons Co.
Moore & White Co.
D. J. Murray Mfg. Co.
Noble & Wood Machine Co.
The Sandy Hill Iron & Brass Works
Shartle Brothers Machine Co.
Valley Iron Works Co.

SUCTION BOXES
Black-Clawson Company
A. E. Broughton & Co.
Downingtown Mfg. Co.
E. D. Jones & Sons Co.
Moore & White Co.
The Sandy Hill Iron & Brass Works
Shartle Brothers Machine Co.
Westinghouse Electric Corp.

SULPHUR
American Cyanamid & Chemical Corp.
Stauffer Chemical Company
Texas Gulf Sulphur Co.
Witco Chemical Company

SULPHUR BURNERS
Valley Iron Works Co.

SULPHUR DIOXIDE
Ansul Chemical Company

TALC
American Cyanamid & Chemical Corp.
W. H. Loomis Talc Corp.
International Talc Company

TANKS
E. D. Jones & Sons Co.
Kalamazoo Tank & Silo Co.
The Manhattan Rubber Mfg. Division of Raybestos-Manhattan, Inc.
The Noble & Wood Machine Co.
H. K. Porter Company Inc.
Rodney Hunt
J. O. Ross Engrg. Corp.
Shartle Brothers Machine Co.
Stowe-Woodward Inc.
United States Rubber Co.
Waldron Corp., John
Youngstown Welding & Engrg. Co.

TENSILE TESTERS
Testing Machines, Inc.

THICKENERS, DECKERS & SAVE-ALLS
Bird Machine Company
Bulkley, Dunton Pulp Co. Inc.
Carthage Machine Co.
Dilts Machine Works
Dorr Co.
Downingtown Mfg. Co.
Montague Machine Co.
Moore & White Co.
D. J. Murray Mfg. Co.
J. J. Ross Company
The Sandy Hill Iron & Brass Works
Shartle Brothers Machine Co.
Valley Iron Works Co.

TITANIUM
E. I. Du Pont de Nemours & Co.
Titanium Pigment Co.
R. T. Vanderbilt Co.
Witco Chemical Company

TOOLS
Acme Steel Company
Ingersoll-Rand Co.
The Stanley Works
Walworth Company

TRUCKS
Automatic Transportation Co.

TRAPS
Armstrong Machine Works
Crane Co.
Grinnel Company
Johnson Corporation
Shartle Bros. Mch. Co.

TUBE MACHINES
Marathon Pdy. & Mch. Co.

TUBS
Rodney Hunt Machine Co.
Noble & Wood Machine Co.
Shartle Brothers
Valley Iron Works Co.

TURBINES
Allis-Chalmers Mfg. Co.
De Laval Steam Turbine Co.
General Electric Company
Hunt, Rodney, Mach. Co.
Westinghouse Electric Corp.
Worthington Pump & Machinery Corp.

USED EQUIPMENT
Frank H. Davis Company
Gibbs-Brower Co.
Thomas W. Hall Co.
Noble & Wood Machine Co.
Rotogravure Engrg. Co.
J. J. Ross Company
Ross Paper Machinery Co.
Shartle Brothers Machine Co.

VALVES
The Bristol Company
Crane Company
Dilts Machine Works
Fibre Making Processes, Inc.
The Foxboro Company
Hills-McCanna Co.
E. D. Jones & Sons Co.
Kennedy Valve Mfg. Co.
Magnus Metal Corp.
D. J. Murray Mfg. Co.
Noble & Wood Machine Co.
The Permutit Company
William Powell Co.
The Sandy Hill Iron & Brass Works
Shartle Brothers Machine Co.
Stickle Steam Specialties Co.
Taylor Instrument Companies
Valley Iron Works Co.
Walworth Company

VATS & VAT PARTS
Union Machine Co.
Union Screen Plate Co.

WASHERS
Bird Machine Company
Downingtown Mfg. Co.
E. D. Jones & Sons Co.
Moore & White Co.
Noble & Wood Machine Co.
The Sandy Hill Iron & Brass Works
Rodney Hunt Machine Co.
Shartle Brothers Machine Co.
Valley Iron Works Co.

WATER CONDITIONING
The Permutit Company

WAXING MACHINERY
Black-Clawson Co.
Potdevin Machine Co.
Rotogravure Engrg. Co.
Shartle Brothers Machine Co.
Waldron Corp., John
Weber, Herman G.

WELDING EQUIPMENT
Allis-Chalmers Mfg. Co.
General Electric Company
Walworth Company
Westinghouse Electric Corp.

WET MACHINES
Black-Clawson Co.
Carthage Machine Co.
Downingtown Mfg. Co.
Moore & White Co.
Montague Machine Co.
Noble & Wood Machine Co.
Pusey & Jones Corp.
J. J. Ross Company
The Sandy Hill Iron & Brass Works
Shartle Brothers Machine Co.
Smith & Winchester Mfg. Co.
Valley Iron Works Co.

WINDERS AND REWINDERS
Black-Clawson Company
Cameron Machine Co.
Dietz Machine Works
Downingtown Mfg. Co.
Thomas W. Hall Co.
Hudson-Sharp Mach. Co.
Langston Co., Samuel M.
The Kohler System Company
Montague Machine Co.
Moore & White Co.
Paper Converting Mch. Co.
Potdevin Machine Co.
Pusey & Jones Corp.
Rotogravure Engrg. Co.
J. J. Ross Company
The Sandy Hill Iron & Brass Works
Smith & Winchester Mfg. Co.
Waldron Corp., John

WIRES
Appleton Wire Works
Black-Clawson Company
Bulkley, Dunton Pulp Co., Inc.
Cheney Bigelow Wire Works
Hayden Wire Works
International Wire Works
Lindsay Wire Weaving Co.
Shartle Brothers Machine Co.

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